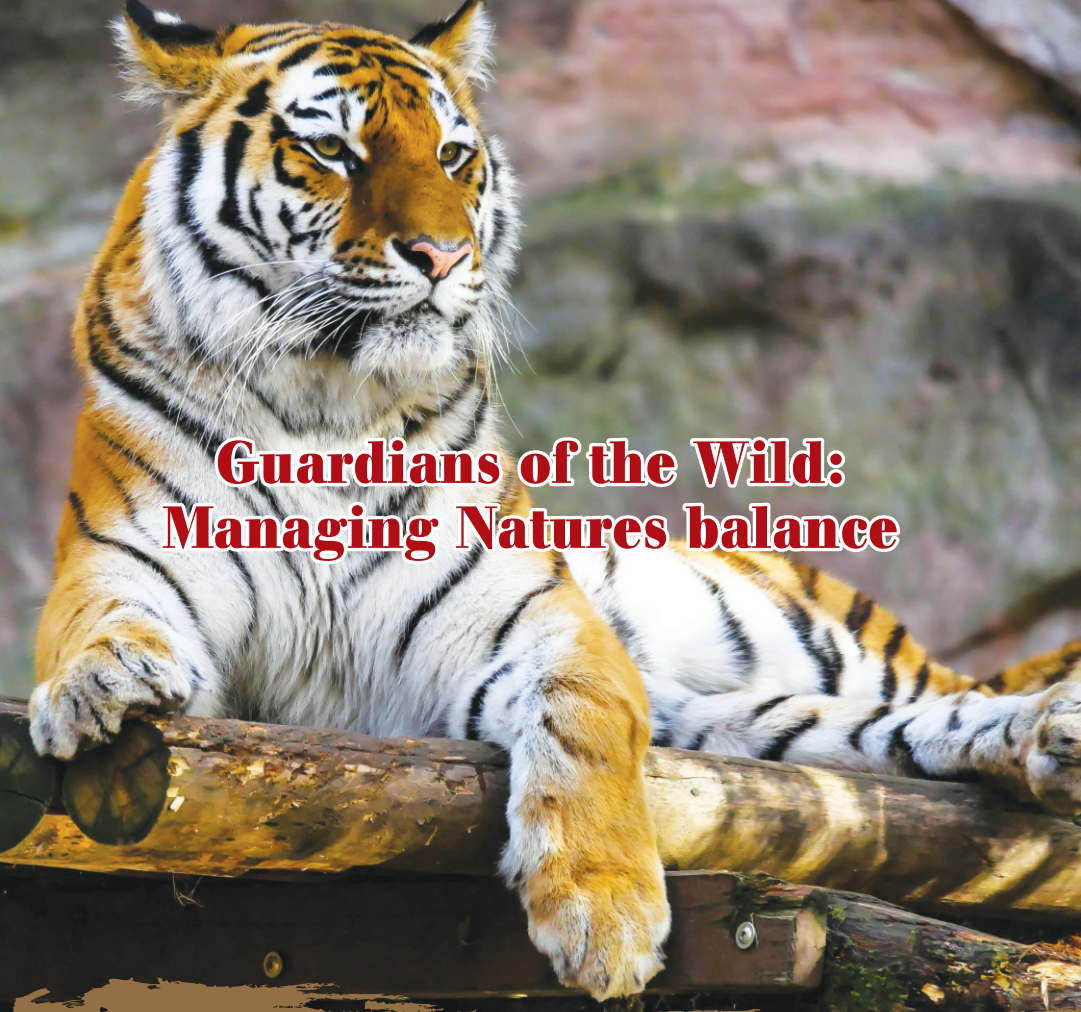


A tiger with orange and black stripes is lying on a large, weathered log. The tiger is looking towards the left of the frame. The background is a blurred natural setting with rocks and foliage.

Guardians of the Wild: Managing Natures balance

*Dr. Bhomika Shrimali
Deepak Kumar Patel*



**CENTRAL ACADEMY FOR STATE FOREST SERVICE
COIMBATORE**

2025

Guardians of the Wild: Managing Nature's balance

by

Dr. Bhomika Shrimali

Deepak Kumar Patel



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FOREWORD

Wildlife management stands at the heart of ecological sustainability, where scientific insight meets compassionate stewardship. India's rich biodiversity presents extraordinary opportunities, yet it also brings forth complex challenges of ensuring harmonious coexistence between people and wildlife.

At the Central Academy for State Forest Service (CASFOS), Coimbatore, Officer Trainees develop essential competencies in habitat management, species conservation, and human–wildlife conflict mitigation. The Wildlife Management module conducted at the Mudumalai Tiger Reserve further enriches this learning experience, seamlessly connecting classroom knowledge with practical field realities.

This publication, *“Guardians of the Wild: Managing Nature's Balance,”* is a reflection of such immersive and experiential learning. It brings together theoretical foundations and practical application, capturing the essence of conservation work on the ground. I commend Dr. Bhomika Shrimali and Mr. Deepak Kumar Patel, State Forest Service Officer Trainee (2023–25) from Chhattisgarh, for their sincere efforts in linking national-level exposure with the specific conservation challenges faced at the local level.

I am confident that this work will inspire forest officers, trainees, and conservation professionals to further strengthen the vital connection between nature conservation and community well-being.



V. Thirunavukarasu, IFS
APCCF & Principal
CASFOS, Coimbatore

PREFACE

Forests and Wildlife are among the most important natural resources of our country. Wildlife plays a vital role in maintaining biodiversity and ecosystem integrity. It is also an integral part of socio economic and cultural life of tribes and local communities. Among all, Wildlife and majestic animals are National pride and heritage of our country. In recent decades, there is rising trend of Human wildlife conflict causing social unrest, threat to wildlife and Law and order situation.

In this regard, this publication '*Guardians of the Wild: Managing Nature's balance*' is an effort to enhance our understanding of Scientific wildlife management practices. This publication is primarily based on our field experience and learnings in Wildlife management module at Mudumalai Tiger Reserve (MTR) along with reviews of various research papers and best practices followed in other tiger reserves across the country.

This publication seeks to inspire readers to see wildlife not as isolated species in remote forests, but an integral thread in the larger fabric of life that sustains us all.

Dr. Bhomika Shrimali
Deepak Kumar Patel
SFS 2023-25 Batch
CASFOS Coimbatore

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We are profoundly grateful to Principal CASFOS Coimbatore Shri V. Thirunavukarasu IFS and the Course Director Dr. C. Vidhyasagar IFS for their invaluable guidance, encouragement, and motivation in undertaking meaningful work in our area of interest.

We gratefully acknowledge,

Field Director and Deputy Director, Mudumalai Tiger Reserve

Dr. K Shankar, Former Director, SACON
Dr. Ramesh Krishnamurthy, Scientist WII
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Dr. Vidyadhar Atkore, Scientist SACON
Dr. M. Palanisamy, Biologist MTR

For their constant guidance, practical inputs and extensive field experience during the Wildlife management module helped us to understand the fundamental aspects of wildlife management.

We also express our sincere appreciation to all the faculty members, the Editorial-Team members, Staff members and colleagues at the CASFOS Coimbatore and SACON, for their continuous encouragement and guidance throughout this journey.

Dr. Bhomika Shrimali
Deepak Kumar Patel
SFS 2023-25 Batch,
CASFOS Coimbatore

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OVERVIEW

Wildlife is an integral part of our planet's natural wealth. Every species, big or small, visible or hidden plays a crucial role in maintaining the delicate balance of ecosystems. Wildlife management is the scientific art of ensuring that this balance is maintained while meeting the needs of both nature and people. It involves understanding animal behaviour, protecting habitats, mitigating human-wildlife conflicts, and using modern technology to support conservation goals.

In earlier times, wildlife conservation was seen merely as protecting animals from hunting or poaching. Today, it has evolved into a multidisciplinary field that combines ecology, sociology, veterinary science, technology, and community participation. Effective wildlife management requires not only scientific understanding but also compassion, awareness, and cooperation among all stakeholders.

This book covers the essential components that form the foundation of wildlife management: Animal Behaviour, Animal Signs and Surveys, Population Estimation Techniques, Result and interpretation Habitat Management, Health Care Management, Technical Interventions, Eradication of Invasive Species, Protection Strategies and Role of Community, Local participation, as seen in models like the Periyar Tiger Reserve and Eco-Development Committees in MTR etc. which forms the backbone of successful conservation efforts.

Wildlife management is no longer limited to forests, it extends to villages, farmlands, and urban landscapes where humans and

wildlife increasingly interact with each other on regular basis. The future of conservation depends on collaboration between government departments, scientists, and communities. By combining traditional knowledge with modern science, we can create sustainable pathways for coexistence.



Fig. Spotted deer (*Axis axis*) in a herd

Chapter 1

INTRODUCTION

Wildlife management refers to the process of regulating and improving the conditions of wild species and their habitats for the benefit of both wildlife and humans. One of the very important aspects of Wildlife management is Ecological census techniques. It is a scientific method used to estimate the abundance, density, and distribution of organisms in an ecosystem to monitor ecological balance and population trends.

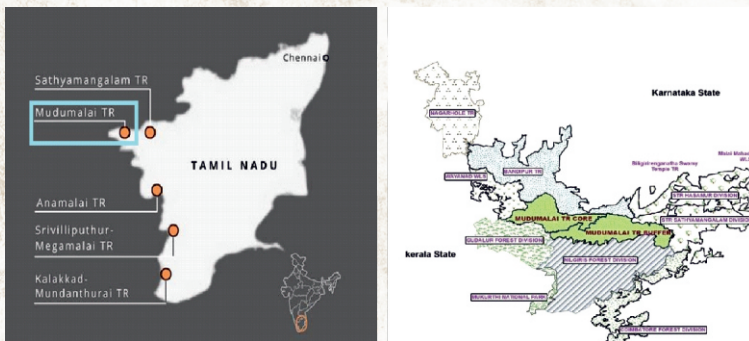


Fig.-1.1 Map of MTR

The basic objective of the Ecological census techniques is to get hands on experience of biodiversity assessment, flora and fauna, to study the sign survey of wild animals and estimating animal abundance, movement patterns and their distribution. This exercise also helps in understanding habitat management activities and importance of special habitats such as riparian zones.

The study area of Ecological census exercise of present literature is in Mudumalai Tiger Reserve.



Fig. 1.2 Mudumalai Tiger Reserve landscape

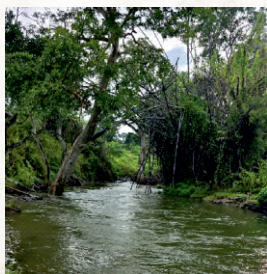


Fig.1.3 Moyar
River Riparian

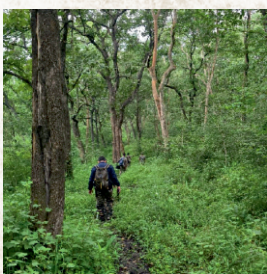


Fig.1.4 Moist
deciduous forest



Fig.1.5 Dry thorn
forest

Flora and Fauna of the MTR - Most common flora found here are *Tectona grandis*, *Anogeissus latifolia*, *Terminalia tomentosa*, *Terminalia arjuna* (in Riparian zone), *Ziziphus mauritiana* (Thorn Forest) etc. Important fauna found here are *Panthera tigris* (Tiger), *Panthera pardus* (Leopard), *Elephas maximus*, *Bos gauras*, *Melursus ursinus* (Sloth bear), *Cuon alpinus* (Wild dog), *Axis axis* (spotted deer), *Rusa unicolor* (Sambar deer) etc.

Management and Conservation Importance of the MTR

This tiger reserve occupies very special geographical position as it lies at the trijunction of Tamil Nadu, Kerala, and

Karnataka. It is an important part of Nilgiri Biosphere reserve. It also acts as a connecting link between Eastern ghat and Western ghat. These connectivity helps in maintaining gene flow. There are 6 elephant corridors passing through this area. This tiger reserve also supports high tiger density having around 165 tigers within a total area of 688 sq. km.

Threats and Conservation challenges - Habitat fragmentation is one of the prime challenges here. Linear infrastructure such as Ooty-Mysore highway, railway lines, power lines fragment the habitat. Crop depredation by elephants and livestock predation by tigers and leopards often result in retaliatory killings by villagers. Another major concern are invasive weeds such as *Lantana camara*, *Senna spectabilis*, *Eupatorium* etc. Also, Domestic cattle from nearby villages graze inside the buffer and fringe forests which may transfer disease such as foot and mouth disease.



Chapter 2

SCIENCE OF ANIMAL BEHAVIOUR

Animal behaviour is the way animals interact with other organisms and their physical environment. Each wild animal follows a unique social, reproductive, feeding, defensive and migratory behavioural pattern to devise survival strategies and to accommodate its physiological needs. Most Herbivores prefer to stay in groups and in open grassland area. They have different types of auditory calls – Alarm call, Mating call etc. They have dominant male in herd, who get priority access to female for mating when they are in oestrus. The dominant males usually drive away rival males by displaying antler postures and sometimes engaging in antler fights. The herd of spotted deer is generally *matriarchal*, consisting mainly of females and their young. Carnivores such as Royal Bengal tiger is a solitary



Fig.2.1 Tigers marking their territory

animal. Tiger establishes their own territory through territory markings like scratches in the trees, scrape marks on the ground, scent marking like urine spray, anal gland secretion. Males have larger territories that overlap with those of several females, but rarely overlap with other Males. They use stealth, patience and camouflage (striped coat) to stalk prey silently and ambush from close range. A single powerful pounce or throat bite is used to kill prey. They prefer dense cover and water edges where prey is abundant. Tigers are also excellent swimmers. Their tails also indicate aggression. If tails are rapidly moving from side to side, it means they are in aggression. If tail is loosely hanging then they are relaxed.

Mega herbivores such as Elephants demonstrate excellent social behaviour. Elephant herds are matriarchal, meaning the herd is led by oldest female elephant. They live in group of 5-20 individuals. Her experience and memory are critical for the herd's survival — she remembers migration routes, water sources, and danger zones. males leave the group when they reach adolescence (around 12–15 years). Adult males are mostly solitary but sometimes form temporary bachelor groups. Mature males enter a phase called musth characterised by high testosterone level and increased sexual

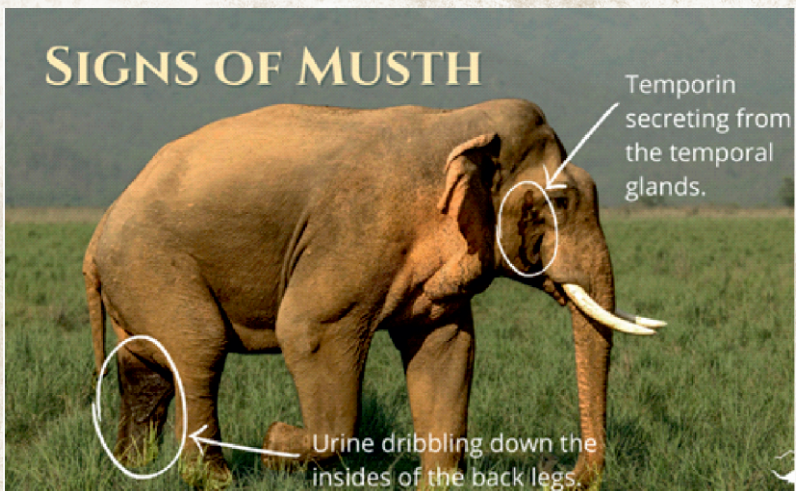


Fig.2.2 Elephant in Musth



Fig. 2.3 Herd of Elephant

activity. During this period their temporal gland start secreting thick oily fluid and urine dribbling in back lags occurs. Musth phase occur every year in a male and occur till 2-4 weeks. During this phase they are highly aggressive and even Kumki elephant can kill their Mahout. There is no fixed calving season in elephant. Age of elephant at first calving is about 14-18 years, and calving interval is 4-5 years.

Gaur is a group living animal. In a typical group there are cows, calves, one or two adult bulls and sub-adults. They Frequently visit area of grassland dominated by *Themeda* species and water sources in the morning, and near teak plantations in evening. There is no distinct calving season in Gaur.

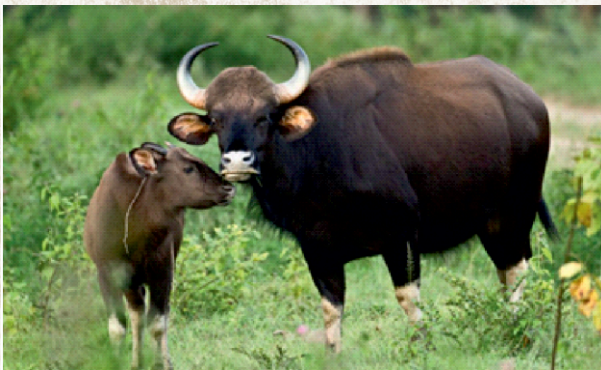


Fig. 2.4 Gaur (*Bos gaurus*)

Diet and Prey preference – A study on Dietary partitioning in sympatric large carnivores in a tropical forest of Western ghats India highlight that Tiger prefer large bodied prey (>50 kg) primarily Sambar and Gaur, while Leopard and Dhole prefer medium sized prey (11-50 kg) such as Spotted deer, Langur. Tiger prefer habitats with dense cover and abundant large ungulates while Leopards found to use a wider range of habitats, including fringe and degraded forests. The study demonstrate coexistence through resource partitioning - each predator focusing on different prey sizes and habitats.

Associations of Langur and Spotted deer – Another study in Mudumalai Tiger Reserve found asymmetrical mutualism between Langur and Spotted Deer. Spotted deer fed on food dropped by langurs - mainly leaves (73%), fruits (17%), and flowers (10%). Spotted deer gain food access, while both species benefit from shared vigilance and alarm calls.

Chapter 3

ANIMAL SIGNS SURVEY

Animals are often elusive and difficult to observe directly, especially in dense forests or during odd hours. Yet, they leave behind a variety of clues-known as animal signs-that reveal their presence, behaviour, and abundance. These signs are the language of the wild. A trained observer can interpret them to identify the species, estimate population, and understand animal movement patterns. Wildlife surveys based on animal signs are a vital part of field management. They help in census, habitat evaluation, and conflict assessment where direct sightings are rare. Animal evidence can be broadly divided into Direct Signs and Indirect Signs.

A) Direct Signs

1. Direct sightings - It include physically observing animals or groups during patrols, transect walks, or camera trap operations. Recording the species, number, behaviour, habitat, and time of day helps build distribution data. For Examples Tiger & Leopard Most often seen during early mornings or late evenings near nullahs and forest roads. Elephant : Herds visible in bamboo groves, river valleys, and near salt licks. Sambar, spotted deer, Blue Bull: Commonly sighted while grazing in open meadows. Primates Langurs and macaques are active during daylight, often visible along canopy corridors.

2. Vocalizations - Calls are equally valuable as sightings; they reveal both the species and its emotional or alert state. Langur : Sharp alarm

calls warn of a predator's presence. Barking Deer: Distinct single barks, often repeated, signal alarm or disturbance. Peafowl: Loud calls often linked with movement of large carnivores. Wild Dogs: Whistling sounds used for pack coordination during hunts.

3. Camera Trap Evidence - Camera traps offer indisputable visual proof of animal presence and activity. The unique stripe or spot patterns of species such as tiger and leopard help in individual identification. They also reveal behaviour, frequency of visits, and interaction among species.



Fig.3.1 Camera Trap

B) Indirect Signs

Indirect signs include physical traces and markings left by animals as they move, feed, rest, or mark their territories. Recognizing and interpreting these clues is a key field skill for any wildlife manager.

1. Tracks and pugmarks : The shape, size, and pattern of animal tracks (pugmarks, hoof marks, or foot impressions) are crucial in identifying species, sex, and sometimes age. A pugmark is the footprint of a large carnivore, especially cats such as tigers and leopards. Each species has a unique shape and pattern, which helps in identification. Hoofmarks are the impressions made by hoofed animals. These tracks help identify grazing patterns, herd size, and habitat use.

Species	Distinctive Features
Tiger (<i>Panthera tigris</i>)	Large, round pugmark (~11–13 cm wide); four toes with rounded edges; central pad broad with three rear lobes; no claw marks. Males have wider prints, females slightly elongated.
Leopard (<i>Panthera pardus</i>)	Smaller (~7–9 cm), more oval; pads narrower; often found along ridges and forest paths.
Sloth Bear (<i>Melursus ursinus</i>)	Five toes; long curved claws clearly visible; entire sole touches ground (plantigrade); gait heavy and irregular.
Sambar (<i>Rusa unicolor</i>)	Broad, heart-shaped hooves (~8–10 cm); impressions deep in mud; often seen near waterholes.
Spotted Deer (<i>Axis axis</i>)	Pointed, delicate hoof marks (~4–6 cm); found in groups; lighter impressions on sandy soil.
Barking Deer (<i>Muntiacus muntjak</i>)	Small, narrow pointed hooves (~2–3 cm); often close to stream beds.
Wild Dog (<i>Cuon alpinus</i>)	Compact, circular track (~6 cm); claws visible; smaller than leopard print.
Elephant (<i>Elephas maximus</i>)	Massive round print (~40–45 cm); surface shows wrinkles or concentric cracks when dry.
Striped Hyena (<i>Hyaena hyaena</i>)	Asymmetrical front pad; claws deeply imprinted; front track larger than hind.



Fig.3.2 Tiger pugmark



Fig.3.3 Leopard pugmark



Fig.3.4 Wild dog track



Fig. 3.5 sloth bear track

2. Faecal matters

Animal droppings are among the most reliable indicators of species presence and diet. Their size, shape, content, and location vary between carnivores, herbivores, and omnivores, helping in identification and habitat assessment.

I) Carnivores (Scats)

Tiger: Cylindrical, 3–5 cm in diameter; segmented; often contains hair, bones, or hooves of prey. Usually deposited on trails or near scent-marking sites.

Leopards: Similar to tiger but smaller (2–3 cm diameter); dark, twisted segments; contains hair and bones.

Wild Dog / Dhole: Smaller scats, often in clusters near resting sites; contain hair and bone fragments.

Striped Hyena: Pale grey or chalky white due to high bone content; found near dens.

Sloth Bear: Coarse fibrous droppings; include fruit seeds, termite soil, or insect parts.



Fig. 3.6 Tiger Scat



Fig. 3.7 leopard scat



Fig. 3.8 Faecal material of sloth bear

ii) Herbivores (Pellets and Dung)

Elephant : Large fibrous dung boli (12–18 cm diameter); composed of grass, bamboo, and leaves; usually found in piles along regular routes. Sambar: Oval pellets, 2–3 cm long; deposited in clusters; dark and glossy when fresh. Spotted deer; Small round pellets, 1–1.5 cm in diameter; shiny and compact; found in herds near open patches. Blue Bull / Nilgai: Elongated oval pellets (2–3 cm), larger than deer; scattered in open grassland. Barking Deer: Tiny, elongated pellets (~1 cm); often found under thick vegetation near streams. Hare: Small, dry round pellets; common in scrub and open fields.



Fig. 3.9 Dropping of sambar deer

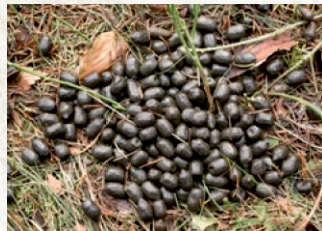


Fig.3.10 Pellet of spotted deer

3. Feeding Signs

Feeding behaviour of animals leaves behind distinct and often easily identifiable traces in the forest. By observing feeding marks, forest staff can determine which species used the area, what they were eating, and how they interact with vegetation or prey. These signs are especially useful in dense forests where direct sightings are rare.

Tiger : Tiger are apex predators and primarily feed on large ungulates such as sambar, Spotted deer, wild pig, and occasionally livestock. They usually kill their prey by suffocating the throat or breaking the neck and then drag it to a secluded place such as a thicket, dry streambed, or behind bushes before feeding. Tigers often consume the internal organs first, followed by muscles from the hindquarters. Feeding sites are usually marked by drag signs, pugmarks, and disturbed vegetation around the carcass. Characteristic signs are partially eaten carcass with ribs crushed or large bones broken, plucked fur scattered around, drag marks leading from the kill site to cover, and pugmarks or scrape marks nearby.

Leopard : Leopards are opportunistic feeders and prefer medium-sized prey such as deer, langurs, wild pig, and smaller mammals. They often carry or drag their kills up trees or rocky ledges to feed in safety away from scavengers and larger predators. The feeding is generally neat, and leopards usually eat the soft internal organs first. Remains of prey are often found beneath trees with scratch marks or plucked fur scattered around. Characteristic signs are half-eaten prey hoisted on tree branches, drag marks along the ground, plucked fur or feathers near kill sites, and scratch marks on tree trunks used for storing kills.

Elephant : Elephants are generalist feeders and their feeding signs are easily recognisable. They strip bark from trees, break branches, and often uproot entire bamboo clumps or small trees to access tender shoots. Freshly broken branches, crushed vegetation, and dung piles nearby indicate recent feeding activity. They also create feeding trails along their migratory routes. Characteristic signs are uprooted saplings, debarked trees, trampled vegetation, and large dung bolus containing fibrous remains.

Sloth Bear : Sloth bears feed mainly on insects, fruits, and honey. Their feeding signs include torn termite mounds, overturned logs or stones, and broken beehives while searching for honey. They use their long claws and strong forelimbs to dig and tear open termite or

ant nests. Characteristic signs are soil scattered around diggings, claw marks on termite mounds, and fruit seeds in droppings.

Deer Species (Sambar, Spotted Deer, Barking Deer): Deer are herbivores and leave very clean, distinct grazing or browsing marks. They nip off grass blades, leaves, and tender shoots with sharp lower incisors, producing a smooth, clean-cut edge (unlike livestock, which tear vegetation unevenly). Feeding signs are often concentrated around salt-licks, meadows, or forest edges where grasses regenerate quickly. Characteristic signs are clipped grass tops, crushed leaf litter, pellet droppings, and tracks clustered around feeding spots.



Chapter 4

WILDLIFE POPULATION ESTIMATION TECHNIQUES

Population estimation of wild animals can be through direct observation or indirect signs and evidences. Indirect methods are used when direct sighting of animals is difficult, especially in dense forests, nocturnal species.

For **Indirect signs**, observation of animal presence through evidences such as pug marks, dung counts, pellet count or through DNA analysis is done. Indirect population estimation should be done during morning, and evening time. For this technique, transect route is clearly identified. Recording of fresh and identifiable signs should be done. Always put a reference length alongside the pugmarks to estimate size of the pugmarks. There is always chance of double counting in this method. For elephant of Dung piles within 2 metres of each other are considered one dung pile. Pellets or dung heaps within 1 metre of each other are treated as one pellet group. The best season for indirect population estimation is post monsoon to winter season (October to February) because after monsoon, soil is soft and moist and ideal for clear pugmarks, droppings. Also, low rainfall does not wash away the evidences. Since number of dung piles in an area depends on number of elephants, number of times they defecate on a day and duration till the dung remains visible.

The Basic formula for Elephant density is then

$$\text{Elephant Density (D)} = \frac{\text{Dung pile density (d)}}{(\text{Defecation rate} \times \text{Dung decay rate})}$$



Fig.4.1 Indirect sign survey observation of Group-3, MTR

Defecation rate is number of dung piles produced per elephant per day. Dung decay rate is average number of days a dung pile remains visible. Dung pile density can be estimated through line transect method. Dung pile density can be found by = dung number / (length of path * width of strip chosen for counting dung). Average defecation rate for Asian elephants: 16–18 dung piles per elephant per day: Average decay time varies by habitat: Moist Forest: 40–60 days Dry Forest: 20–30 days.

Use Availability index – There is another important indicator which provide information about preference of animals to particular vegetation type. For this index, a transect line is divided into segments of 250 m each, and most dominated vegetation such as – Teak dominated, Mixed Forest, *Terminalia* dominated forest is identified. Then number of indirect signs of the particular animal in each segment is observed. If there are multiple groups, then no. of signs is summed corresponding to each vegetation type. Then

$$\text{Use availability index} = \frac{(r-p)}{(r+p)}$$

where r = total number of signs found on particular vegetation divided by total signs during entire line transect

p = ratio of total number of segments of particular vegetation and total number of entire segments.

Suppose during the survey we found 36 Elephant dung in *Tectona grandis* dominated stretch. Total 60 elephant dung were found combining all vegetation types. There are 5 *Tectona grandis* segment out of 20 total segments. Then $r = 36/60 = 0.6$, $p = 5/20 = 0.25$. Use availability index turn out to be 0.368. if the ratio is +1, it is highly preferable vegetation for that animal. If it is -1 then that vegetation is avoided by the animal. 0 indicates neutral response.

Direct method – Direct count method is direct sighting of the animal and based on that estimation of animal density. Following are various methods.

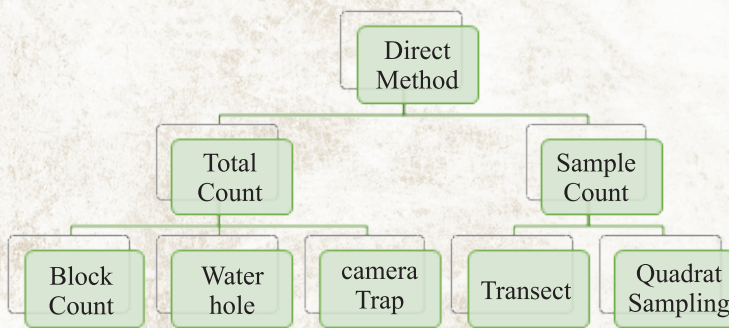


Chart- 4.1 – Direct method of population estimation

Block count method is mainly used to count large and sedentary species like Elephants, Gaur. In this case entire area is divided into various blocks and observers move in a pre-determined track in each block at same time. The **waterhole method** estimates animal population by counting individuals visiting water sources (natural or artificial waterholes, tanks, ponds).

Camera trap method is based on Mark and recapture analysis of wild animals. Generally used for large carnivores. In this methods, Infrared camera are set on animal trails (often done for carnivores found in the area). The camera triggers whenever a warm-blooded

animal crosses camera line. Once Camera captures the tiger, computer program marks it the stripe marking of the animal is used to identify when it recaptures the animal.

Quadrat method is used to estimate the plant density, or immobile animals like Corals. In this case, herbs shrubs and trees are observed in quadrat plots circular areas of 1m, 5m, 10 m radius respectively.

$$\text{Population density} = \frac{(\text{Total individuals in all quadrats})}{(\text{Number of quadrats} * \text{Quadrant area})}$$

In **transect sample count**, two approaches are followed - Vehicle transect method and line transect method on foot. Vehicle based transect method is common and efficient method for large and medium sized mammals especially in open habitats. For vehicle transect method, a safari vehicle is used on which there is clear visibility. Whenever any animal is sighted, vehicle is stopped at point where animal is perpendicularly located from the vehicle route. If animal doesn't move then their number in the herd and mean perpendicular distance is estimated through Range finder. If animal has escaped then, distance of nearest tree or shrub where animal was located is observed. Then formula for Animal density turn out to be

$$\text{Density} = \frac{\text{total number of animals sighting}}{(2 * \text{Length} * \text{Mean perpendicular sighting distance})}.$$

Another parameter used for wildlife is **Encounter rate** which is the ratio of number of sightings and total transect length.

Number '2' in the denominator indicates that sighting is done on both side of vehicle. In vehicle transect method if any animal is sighted on road, then its distance is taken as 0. Vehicle based transect should be generally conducted in early morning (6-9 am) and late evening (4-6 pm) when animal activity is high. Maintain slow, uniform speed (10-20 km/hr) for accurate detection. Avoid sudden acceleration or noise. Record GPS coordinates for every sighting. Choose different routes every time for better estimation of density.

Other way of direct method is line transect on foot method – This is done in dense vegetation where vehicle movement is not possible and also there is need of absolute silence to detect animal presence. Here the team moves in a pre-determined route. Bearing angle of the route is found before start of transect. Here when any animal is sighted, its distance and angle is monitored through range finder and compass, and recorded in the record book. After the field survey, calculation part is work out.

Here perpendicular distance is estimated through following approach.

$$\text{Perpendicular distance} = \frac{\text{length of sighting} * \text{Sine (bearing of animal – bearing of the route)}}{1}$$

Then Density will be same as formula used for vehicle transect above.

During the Line transect on foot method, care is to be taken to observe animals on the branches of trees. Use ocular method of distance estimation when vegetation is dense. Maintain safe distance from large animals. Observe the animal from the front when the compass makes acute angle with the transect path.

Point count for Birds – This method is used for bird density estimation. It involves an observer standing at a fixed-point location for a specified duration and recording all birds seen or heard within a defined radius. Then Where r is in meter.

$$\text{Bird density in hectare} = \frac{\text{Total number} \times 10000}{(\pi \times r^2)}$$

This survey should be done early in the morning (5:30 am – 9:00 am) when bird activity and vocalization are highest. Use of Merlin app can provide much details of the bird presence through audio detection. In any particular point, stay for at least 5 minutes for

better detection of birds. If any auditory call is not clear, then mark it as 'unknown call'. Use of Binoculars can help detect smaller birds. Conduct surveys across different seasons (breeding, post monsoon, winter), to capture variation.



Fig.4.2 Point count methods for Bird density estimation, MTR

Riparian Vegetation Index is an ecological indicator used to evaluate the health, structure, and quality of vegetation along riverbanks. In Riparian Vegetation Index, Following are the parameters.

Parameters for RVI	Score
Extent of Vegetation cover (EVC)	0-10
Extent of disturbance (EVC)	0-10
Structural intactness –tree, shrubs, grass (SI)	3-continuous, 2- clumped, 1-scattered, 0-sparse
Percentage cover of Exotic, terrestrial, reed spp. (PCIRS)	0-5
Recruitment index (RIRS)	0-5

$$RVI = [(EVC) + \{(SI*PCIRS) +(RIRS)\}]$$

RVI Score	Assessment class	Description
19-20	A	Unmodified
17-18	B	Few modifications
13-16	C	Moderately modified
9-12	D	Largely modified
5-8	E	Loss of natural habitat
0-4	F	Critical level of modification



Chapter 5

RESULTS AND INTERPRETATION

Based on field survey and data collection in MTR, following results were observed for Ecological census techniques.

Table 5.1: Sign Survey

Groups	Tiger	Leo pard	Sloth Bear	Spotted deer	Sam bar	Gaur	Ele phant
1	4	0	2	4	0	1	5
2	6	0	2	8	0	2	9
3	1	1	1	6	0	3	8
4	3	0	2	9	1	1	11
5	1	1	2	12	0	6	14
6	1	2	4	8	0	4	7
7	3	6	3	4	0	3	7
Total sign	19	10	15	51	1	20	61
Encounter rate	1.35	0.71	1.07	3.6	0.07	1.42	4.35

Based on above sign survey, Encounter rate of various wild animals was estimated. Among the predator's tigers encounter was observed to be more than leopard. Among prey species, spotted deer encounter rate was observed to be highest, followed by Gaur and Sambar. Among all wild animals, elephant relative abundance was found highest.

Table 5.2: Vehicle based transect density in sq. km

Groups	Spotted deer	Gaur	Elephant	Sambar	Langur
1	94	47.8	4.76	-	-
2	269.73	-	2.20	-	97.93
3	392.33	-	-	-	83.33
4	422.3	-	-	-	50.2
5	112.5	-	1.315	—	
6	9.80	-	-	-	24
7	370	-	100	-	125

Based on data collected by all seven groups on vehicle-based survey, the density of each species is calculated using the density formula and presented in the table no 5.2. According to the data it was observed that most common species observed was spotted deer. Among the arboreal species, most commonly observed species was langur.

Table 5.3 Point count for birds

Bird sp.	Gr-1	Gr-2	Gr-3	Gr-4	Gr-5	Gr-6	Gr-7
Parakeet	5.95	6.31	-	-	3.01	48.36	42.44
Myna	-	-	-	-	2.35		31.83
Bulbul	-	19.86	28.9	14.93	-	35.27	25.25
Tailorbird	-	-	9.83	4	-	2.59	15.86
Babbler	-	86.10	88.20	56.84	-	6.02	1.27
Barbet	-	-	66.37	-	-	14.15	3.97
Coucal	-	-	5.53	-	-		
Drongo	-	16.41	-	5.86	21.36	-	-
Oriole	23	-	-	-	2.33	-	-

Based on the above point count survey, it was observed that most commonly sighted species were babbler, parakeet and bulbul.

Table 5.4: Use availability index (UAI)– vegetation data

Groups	<i>Anogeissus latifolia</i>	<i>Tectona grandis</i>	<i>Terminalia tomentosa</i>	Mixed
1	8	-	-	-
2	4	1	1	2
3	2	-	1	5
4	5	-	3	-
5	6	-	2	-
6	1	-	2	5
7	2	-	-	6
Total	28	1	9	18
p = no. of patches/total patches	28/56 = 0.5	1/56 = 0.017	9/56 = 0.16	18/56 = 0.321

Table 5.5: Use availability Index – Tiger sign survey

Groups	<i>Anogeissus latifolia</i>	<i>Tectona grandis</i>	<i>Terminalia tomentosa</i>	Mixed
1	4	-	-	-
2	2	-	-	-
4	-	-	-	-
3	-	-	-	1
4	2	-	1	-
5	1	-	-	-
6	-	-	-	1
7	-	-	-	3
Total	9	-	1	9
r = no. of use/total use	9/19 = 0.47	0/19 = 0	1/19 = 0.05	9/19 = 0.47

Based on above field survey, use availability index was found by formula $(r-p)/(r+p)$

For *Anogeissus latifolia* UAI = -0.03

For *Tectona grandis*, UAI = -1

For *Terminalia tomentosa*, UAI = -0.52

For Mixed Forest, UAI = 0.188

This indicate that, tiger prefers mixed forest, neutral towards *Anogeissus latifolia*, and avoid *Tectona grandis* and *Terminalia tomentosa*.

Chapter 6

HABITAT MANAGEMENT

Habitat management is one of the most important management aspects for wildlife. Habitat management involves creation of nutritious grassland for herbivores, removal of Invasive alien species, controlled burning of grasses, providing adequate water facilities, relocation of settlements from the protected areas, providing wildlife corridors for movement between one protected area to other protected area. From the results of field survey, it was observed that, Tiger has better preference for mixed forest, compared to other type of vegetation, so keeping the ecological integrity of the forest is very important. It was observed that although density of spotted deer is good, but density of sambar was low. Thus, there is need for habitat intervention to increase sambar population since Sambar is main prey species of tiger.

Under grassland restoration and management – native palatable grasses should be planted. In MTR, grasses such as *Themeda triandra*, *Themeda cymbaria* are planted. '*Themeda triandra*' is high quality perennial grass and a preferred fodder for Elephants and Deer. Elephants feed on this grass especially during the monsoon and early dry season when it is tender. *Themeda cymbaria* also a palatable grass species found in forest and grassland areas, but it is moderately preferred by herbivores. Herbs such as *Ageratum conyzoides* is a herbaceous weed. Spotted deer and sambar eat young grass, but its older grass contains toxic compound and it need to be removed. As per the research study, tree species occupies largest share in their diet, accounting for 56%, followed by shrubs (20%),

Herbs (14%) and climbers (10%). Tree such as *Madhuca indica*, *Mangifera indica*, *Aegle marmelos*, *Ziziphus mauritiana* form extensive proportion in their food. Elephants also prefer Malvaceae family species such as *Helicteres isora*. Elephant browse on the leaves, branches and the twigs of this species. Spotted deer prefers grassland-deciduous forest ecotones. A study in Mudumalai Tiger reserve highlight that Spotted deer prefer open dry deciduous forest, Sambar and Gaur prefers moist and mixed deciduous forest. **Habitat heterogeneity** (mixture of dry and moist forest types) plays a key role in sustaining diverse herbivore communities.

Riparian habitat – These are the linear landscape along the riverine area which form the transition zone between aquatic and terrestrial habitat. This habitat serves as a seasonal corridor for wild animals.

Vayals (Swamp) Management - This is a special habitat where animal abundance is high. These areas are ideal habitat for fresh and nutritious grasses such as grasses of *Cyperus* members. The animals mainly consume *Cyperus* members. It also acts as water storing areas. Management of swamp involves removal of exotic weeds, growing of palatable grass species in the Vayals/Swamp areas. Grasses such as *Sporobolus fertilis*, *Cyrtococoumoxy phyllum* and *Imperata cylindrica* were distributed in Vayal areas in Mudumalai Tiger reserve.

A study in Pench Tiger Reserve found spotted deer, Indian Gaur, Wild pig most preferred area is short grass land habitat. Sariska Tiger Reserve grassland management strategy is also important to mention here. Forest department has established grass nurseries in 4 sites to produce seeds for barren areas. They are planting local grass varieties such as Guwan, Phulwa, Makra etc. They are also tackling invasive species like *Cassia tora* and *Parthenium* which threaten native grasslands. Sariska Tiger Reserve has also divided core area into various zones- strict natural zones, habitat restoration zone, tourism zone and administrative zone. The habitat restoration zone is that area where relocation of villages has occurred. These areas are

being developed as grass lands for improving the prey base. Habitat management work also includes providing water facilities for the wild animals within the Protected areas. This includes creation of saucer, ponds. In MTR, weeds and shrubs are cleaned around the roads which provide habitat for Herbivores.

In Sariska Tiger Reserve there is natural waterholes and rainwater harvesting techniques to capture water during the dry season. Minimum of one waterhole in 5 sq. km is prescribed in the Tiger conservation plan. It is important to review the current water resources through GIS mapping based on spatial and temporal distribution. This will help in reducing the congregation of water holes in particular area and help in even distribution. It will also help in reducing pressure from livestock. There can be efforts to improve overall water regime through soil moisture conservation works such as check dams, percolation tanks, contour bunding.

Similarly, Kanha Tiger Reserve known for its very high prey density employs habitat management strategies such as removal of invasive species, grassland relief enclosures, forest understory restoration, encroaching brushwood removal. Seasonal water bodies become lifeline of Kanha during critical dry period. Creation of artificial waterholes in crucial habitats, Improvement of water retention in tanks through desiltation, and solar borewell installation plays crucial role in management of this tiger reserve.



Fig.6.1 Spotted deer using the Artificial waterhole



Fig.6.2 Water hole MTR



Fig.6.3 Grassland habitat in MTR

Chapter 7

HEALTHCARE AND VETERINARY INTERVENTIONS

Health management and veterinary intervention form an essential part of wildlife conservation in protected areas. Wild animals, though adapted to survive in natural conditions, are not free from diseases, injuries, or stress caused by environmental or human-related factors. Maintaining the health of wildlife populations ensures ecological stability, successful breeding, and the long-term survival of species. Unlike domestic animals, wild animals cannot be handled frequently; hence, their health care requires specialized scientific approaches that cause minimal disturbance. Veterinary interventions include disease monitoring, rescue and rehabilitation, immobilization, diagnosis, treatment, and post-mortem examinations. The main objective is to prevent and control diseases, reduce suffering, and support the conservation goals of protected areas.

Health management in carnivores - Carnivores play a vital role as apex predators in the ecosystem, and their health reflects the overall health of the habitat. Common carnivores found in protected areas include tigers, leopards, wild dogs, jackals, and hyenas. These species face several health challenges such as viral infections, parasitic infestations, injuries, and nutritional deficiencies.

Common Diseases in herbivores :

Disease	Causative agent	Symptoms/ sign	Mode of transmission	Control and prevention measure
Canine distemper	Canine distemper virus (<i>Paramyxoviridae</i> family)	Fever, nasal discharge, disorientation, convulsions, paralysis and death	Direct contact or aerosol from infected domestic dogs	Vaccination of domestic dogs around protected area, regular health surveillance of wild animals.
Rabies	<i>Lyssavirus</i> (<i>Rhabdoviridae</i> family)	Aggressive behavior, excessive salivation, paralysis in later stage	Bite or saliva contact from infected animals	Mass vaccination of dogs and livestock around protected areas, removal of feral dogs
Feline panleukopenia (Feline distemper)	<i>Parvovirus</i>	High fever, vomiting, diarrhoea, dehydration, mortality in cubs	Contact with infected faeces, urine or contaminated surfaces	Vaccination for captive population

Veterinary interventions for carnivores

Veterinary interventions for carnivores include immobilization, medical treatment, rescue, and post-mortem examination. Immobilization is carried out by trained veterinarians using dart guns and suitable drug combinations such as Ketamine–Xylazine or Medetomidine–Ketamine. This is done during rescue operations, health check-ups, or translocation programs. Treatment includes wound cleaning, administration of antibiotics, intravenous fluids, and supportive care. Rescued or injured animals are shifted to rescue and rehabilitation centres where they are kept under observation until recovery. Post-mortem or necropsy examinations are conducted under strict biosafety conditions to determine the cause of death and to detect disease outbreaks or poisoning cases. Regular disease surveillance, camera trap monitoring, and vaccination of domestic dogs in fringe villages help prevent disease transmission to wild carnivores.

Health management in herbivores - Herbivores form the primary prey base for carnivores and are crucial for maintaining the ecological food web. Healthy herbivore populations ensure food availability for predators and sustain ecosystem balance. Common herbivores in Indian protected areas include elephants, gaur, blue bull, sambar, spotted deer, and barking deer. These animals face diseases and challenges such as bacterial infections, parasitic infestations, nutritional deficiencies, and accidental injuries.

Common diseases in herbivores:

Disease	Causative agent	Symptoms/ signs	Mode of transmission	Control and preventive measures
Foot and mouth disease (FMD)	<i>Aphthovirus (picorna viridae)</i>	Blisters in mouth and hooves, drooling of saliva, lameness and weight loss	Direct contact with infected livestock	Vaccination of livestock around protected areas (ring vaccination)
Anthrax	<i>Bacillus anthracis</i>	Sudden death, bleeding from natural orifices, absence of rigor mortis	Inhalation or ingestion of spores from contaminated soil or water	Proper carcass disposal by deep burial or complete burning, soil disinfection, livestock vaccination
Haemorrhagic septicemia	<i>Pasteurella multocida</i>	Fever, swelling of throat and brisket, respiratory distress	Ingestion of contaminated feed or water	Vaccination of nearby livestock
Elephant endotheliotropic herpes virus (EEHV) in elephants	Herpes virus	High fever, facial and trunk edema, bluish tongue, nasal bleeding	Direct contact through trunk secretions, saliva or mucus	In captivity routine blood screening, stress reduction, isolation of suspected cases.

Veterinary interventions for herbivores

Veterinary interventions for herbivores include preventive vaccination of livestock around buffer zones, treatment of injured or weak animals, and regular monitoring of disease trends. Tranquilization is used to safely handle animals during treatment or translocation. Veterinarians collect faecal and blood samples for laboratory analysis to identify parasites or pathogens. Proper carcass disposal through deep burial or burning is practiced to prevent disease spread. Habitat management measures such as creating salt licks, improving fodder availability, and maintaining waterholes help prevent nutritional stress. Frontline staff and forest guards are trained to observe signs of sickness such as limping, weakness, or abnormal behaviour in herbivore herds.

Preventive health measures is more effective and ethical than curative interventions in wildlife management. Regular disease surveillance is carried out through dung, blood, and tissue sampling. Livestock vaccination in buffer zones prevents cross-transmission of diseases such as FMD and Anthrax. Carcasses of dead animals are promptly disposed of by deep burial or incineration to avoid the spread of infectious agents. Waterholes and salt licks are maintained to ensure adequate mineral intake and prevent deficiencies.

Ethical and safety considerations - Animals should only be tranquilized or handled when necessary for their welfare, scientific research, or conservation management the guiding principle of wildlife health care is to ensure minimal stress and maximum welfare of the animal.



Chapter 8

TECHNOLOGICAL INTERVENTIONS

Technology plays indispensable role in effective management of Wildlife in the country. **Radio telemetry** is one of the primary methods for tracking the movement of Animals. In this method, a collar fitted with Radio transmitter is put on the neck of the animal. There can be variety of collars. **VHF collar** send simple radio signal. Its range is 1-5 km.

The signal is received through Antenna and Receiver kept by the monitoring person. **GPS collar** uses GPS Satellites. Its range is global. Data stored in transmitter is transmitted periodically. Similarly, **GSM collar** uses cellular network. Its range is in network area only. It directly sends the data as SMS or via mobile data. Collar weight should not be more than 5% of the body weight of the animal.

It should be adjusted so that it should not be too tight to cause injury or too loose to slip off. Variety of data can be collected through this such as daily movement distance, home range and territory, feeding and resting sites, mortality. Various sensors such as Movement sensors, Activity sensors, can be fitted to monitor specific activity.

There is another collar called detachable collar- also called drop off collar. This collar automatically falls off the animals when remotely triggered by the researcher. In VHF radio collaring there are 2 kinds of techniques to locate an animal. These are **Homing-in Technique** and **Triangulation technique**. In Homing in Technique,

monitoring person follows the radio signal (beep sound) directly to locate the animal in the field. It is direct method. Triangulation technique, involves taking 2 or more directional bearing from different known locations and through intersection, animal position can be located. It is indirect method.

M-STripES: Monitoring System for Tigers - Intensive Protection and Ecological Status) is an application used for Tiger conservation in India. The M-STripES Program uses GPS and General Packet Radio Services (GPRS) which record patrol tracks and field data from smart phones. Field staff carry android devices which log their route while patrolling. Even in areas with no mobile network, the app works offline. These data is fed to the web analytical engine that process and analyse data using GIS and statistical tool for management inference. The data also include Geotagged photographs of patrol tracks, crime scenes animal sightings.

Drone technology and Thermal imaging sensors are another important technological intervention which provides aerial monitoring of wild animal's day and night. It has GPS and IMU sensors which enables precise navigation of the flight paths. Thermal infrared sensors detect warm blooded animals even during night. Multispectral cameras capture habitat mapping and vegetation analysis. Data from the drones is sent in real-time to a command-and-control centre. Hosur forest division in Tamil Nadu is actively using drone technology and thermal imaging sensor.

Another important tool used for Wildlife monitoring is Camera traps. Automated motion-sensitive cameras are used to monitor wildlife without human disturbance. They work by detecting movement or heat through **Passive Infrared (PIR) sensors**, which trigger the camera to capture photos.

Modern camera traps use **infrared flash** for night vision, **time stamps**, and **GPS tagging** to record accurate data on species. During installation of camera traps, the height should be properly adjusted. It

should be usually 30-45 cm for medium sized mammals and 50-70 cm for large carnivores. Avoid facing the camera **directly east or west** to prevent sun glare. North or south-facing positions are ideal. Camera traps should be installed in areas where signs of animal activities high such as near water sources.

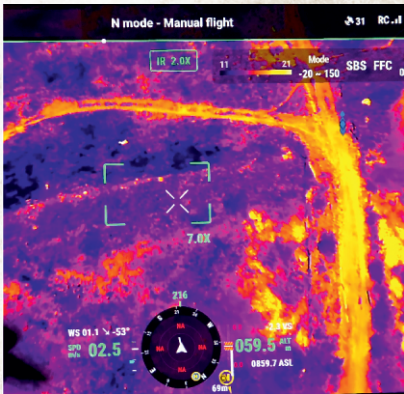


Fig.8.1 Drone and Thermal imaging sensor



Fig. 8.2 Radio Collaring of Elephant



Fig. 8.3 Camera traps installation



Fig. 8.4 Radio telemetry signal Antenna and receiver

Chapter 9

ERADICATION OF INVASIVE ALIEN SPECIES

Invasive Alien Species (IAS) are among the greatest threats to biodiversity and ecosystem health worldwide. They are plants, animals, or microorganisms introduced intentionally or accidentally outside their natural habitats, where they spread aggressively, out compete native species, and alter ecosystem processes. In protected areas and forests, these species can disrupt ecological balance, reduce native vegetation, and negatively affect wildlife habitat and regeneration. The eradication and control of invasive alien species is therefore a critical component of wildlife and habitat management in India's protected areas.

According to the Convention on Biological Diversity (CBD), “An Invasive Alien Species is a species whose introduction and spread threaten ecosystems, habitats, or native species.” In simple terms, these are non-native organisms that establish, spread, and cause ecological, economic, or social harm.

Lantana camara, *Parthenium spp.*, *Chromolaena odorata*, *Prosopis juliflora*, *Eupatorium spp.*, *Mikania micrantha*, *Acacia mearnsii*, *Senna spectabilis* etc. are common invasive alien species found in India.

Methods of Eradication and Control - Effective management of invasive species requires a combination of mechanical, chemical, biological, and ecological restoration approaches. The strategy depends on the species, area, and intensity of infestation.

Mechanical removal - Manual uprooting, cutting, or digging out invasive plants along with roots before seed formation. Commonly used for *Lantana camara* and *Eupatorium adenophorum*. Involves root stock removal and periodic follow-up to prevent regrowth. Biological Control - Introduction of natural predators, insects, or pathogens to control invasive plants. For example, *Zygogramma bicolorata* beetle can be used to control *Parthenium hysterophorus*. Ecological Restoration - After removal, native vegetation must be reintroduced to prevent reinvasion.

The Shola Trust Model - A remarkable example of innovative invasive species management comes from the Shola Trust, an NGO based in the Nilgiri Biosphere Reserve (Tamil Nadu). The Trust has pioneered the “Lantana Craft Project”, which turns the invasive plant *Lantana camara* a major ecological threat - into an eco-friendly resource.

It follows Sustainable Eradication. Local communities are trained to harvest Lantana manually, thereby helping to reduce its density in forests. This not only aids ecological restoration but also provides alternative livelihood opportunities.

Value Addition and Craft Work: The harvested Lantana stems are seasoned, treated, and used to make furniture, baskets, lamps,



Fig.9.1 The Shola trust craft work

and handicrafts, replacing bamboo and wood products. These items are marketed under the brand “Lantana Furniture”, promoting a circular green economy. It also helps in Community Empowerment. Tribal and local people, especially women, are involved in craft production. The initiative generates income while contributing to forest restoration.



Chapter 10

PROTECTION STRATEGIES

Wildlife protection forms the foundation of conservation management in India's Protected Areas. The objective of protection strategies is to safeguard wildlife, habitats, and forest resources from human-induced threats such as poaching, illegal trade, encroachment, forest fires, and habitat degradation. Since many species move beyond the boundaries of protected areas into corridors and buffer zones, protection measures must also address external pressures like human-wildlife conflict, crop damage, and accidental killings.

Protection Infrastructure: A robust protection network ensures the safety of wildlife and forest resources through infrastructure such as protection camps, check posts, and patrolling networks.



Fig. 10.1 Anti Poaching Camp, MTR

Protection Camps and Watchtowers: These are strategically placed for round-the-clock monitoring, providing shelter and operational bases for guards. **Anti-Poaching Camps:** Located in vulnerable zones, these are equipped with communication tools, GPS units, and medical supplies, supporting intelligence gathering and rapid response operations. **Communication and Transport:** help to coordinate swift action against threats.

Patrolling and Surveillance Systems is done by M-STriPES (Monitoring System for Tigers - Intensive Protection and Ecological Status). **Night Patrolling:** Conducted during high-risk periods to prevent poaching and safeguard nocturnal wildlife. **SMART Patrolling (Spatial Monitoring and Reporting Tool) :** Uses mobile-based data collection for analyzing patrol coverage and improving accountability. **Physical Barriers and Check Posts :** Check posts regulate entry and exit points, preventing illegal transport of forest produce. **Elephant-proof trenches (EPTs),** solar-powered fencing, and bio-fencing using plants like Agave and Euphorbia help minimize human–wildlife conflict. These non-lethal barriers protect farmlands and settlements adjoining forests.

Livestock predation is an important cause of Human wildlife conflict. A study on 'Patterns of livestock predation risk by large carnivores in India's Eastern and Western Ghats' highlights that conflict is mainly due to livestock predation which result in retaliatory killing. Predation risk was highest near forest edges and water sources. There is also changing dietary pattern of carnivores from wild prey to domestic prey. The study suggests predation risk maps to guide villagers and forest staff on high-risk zones. Promote stall-feeding, predator-proof enclosures, trained guard dogs, and rapid compensation systems.

Corridor Protection and Conflict Mitigation : Wildlife corridors and structures such as underpasses and overpasses facilitate safe animal movement across highways and railways, as seen in Pench and Chandrapur. Early warning systems using motion sensors, alarms, and mobile alerts help reduce human-elephant conflict.

Rapid Response Teams (RRTs) manage emergencies with tranquilizing gear and rescue kits.



Fig. 10.2 Vehicle Transect Survey



Chapter 11

ROLE OF COMMUNITY

Community engagement lies at the heart of effective wildlife conservation, since protected areas are rarely isolated from local populations - rather, they are intertwined with human livelihoods, culture and land-use patterns. The establishment of eco-development committees (EDCs) constitutes a pivotal strategy in reconciling conservation objectives with community welfare. The role of EDCs is multifold. Firstly, they provide alternative livelihood opportunities that reduce pressure on the forest: for example, training members as tourist guides, operating community-based tourism ventures (treks, bamboo rafting), marketing forest-adjacent products (pepper, non-timber forest produce), and supplying LPG to reduce fuelwood harvesting. Secondly, through micro-planning and village development funds, the EDC model integrates conservation with socio-economic uplift - investing in infrastructure, self-help groups, awareness-raising and community welfare.

In this regard Periyar Tiger reserve EDC involvement and community engagement is worth mentioning here. There, local people were encouraged to form eco development committee. It had 2 objectives - to reduce the dependency of people on forest and to convert poachers into protectors. This was done by providing livelihood opportunities for them. They started Bamboo rafting programme for tourists. One very important result was that, the Poachers have been converted to protectors, and devoted trackers. Their knowledge about Forest and Poaching network help in bursting the Poaching activities. The Tribal trekkers eco

development committee provide services like day treks, nature camps, horse riding. In turn, these committees assist department during animal census, wildlife conservation. There is also clear evidence of increase in number of animals in the Periyar tiger Reserve. Periyar Tiger reserve has achieved 1st place as a best managed Tiger reserve in India with Management effectiveness evaluation score of 94.38% consistently in recent years.

Mudumalai Tiger reserve Foundation and Eco-Development Committees has successfully created community-based tourism enterprises (CBTEs). These involve local tribal groups (Irular, Kurumba, Kattunayakan, Paniyan, Toda, Badaga) as partners in managing eco-tourism. The success of “The Elephant Whisperers” (Oscar - winning documentary, 2023) featuring Bomman and Bellie - tribal caretakers - brought international attention. MTR has also established Mahout village which provide good housing and accommodation for them.

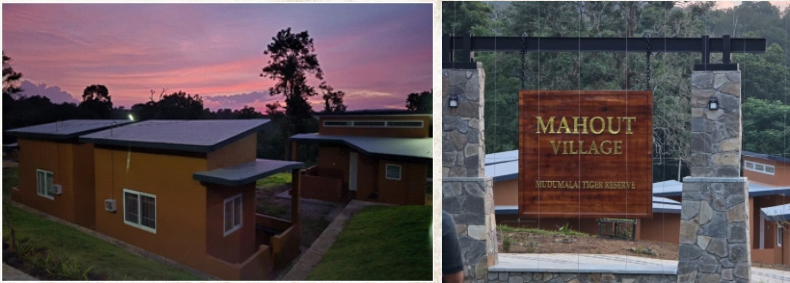


Fig. 11.1 Mahout Village, MTR

Chapter 12

CONCLUSION

Wildlife management represents a harmonious blend of science, compassion, and stewardship. It is not merely about protecting animals but about preserving the intricate web of life that sustains ecosystems and human well-being. Through a combination of habitat restoration, effective patrolling, veterinary care, and modern technologies such as drones, camera traps, and radio collars, conservationists ensure that wildlife populations remain healthy and habitats remain resilient. Equally vital is the role of community participation - Eco - Development Committees, local guardians, and awareness initiatives transform conservation into a shared responsibility. When local people become protectors rather than adversaries, coexistence replaces conflict, and conservation becomes sustainable.

India's remarkable recovery of species like the tiger and elephant demonstrates the success of coordinated management rooted in science and community trust. The future of wildlife conservation lies in continuous innovation, adaptive management, and a deep respect for ecological balance. Wildlife management, therefore, is not just a professional duty but a moral commitment - a pledge to protect the planet's wild heritage for generations to come, ensuring that the roar of the tiger, the trumpeting of the elephant, and the song of the birds continue to echo across our forests forever.

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Dr. Bhomika Shrimali, an Assistant Conservator of Forests (ACF) currently training at CASFOS, Coimbatore, holds a degree in Veterinary Science and Animal Husbandry from the College of Veterinary Science and Animal Husbandry, Anjora (Durg), Chhattisgarh. She has served as a Wildlife Veterinarian at Nandanvan Jungle Safari Zoo, Nava Raipur, and as a Veterinary Assistant Surgeon in the Livestock Development Department, Government of Chhattisgarh. Combining strong field experience with scientific expertise, Dr. Shrimali's deep interest in wildlife conservation and forestry continues to shape her professional journey.



Shri Deepak Kumar Patel, an Assistant Conservator of Forests (ACF) currently training at CASFOS, Coimbatore, hails from Chhattisgarh and holds a Mechanical Engineering degree from IIT Guwahati. His deep passion for nature and wildlife led him to join the Forest Service, and he is also an enthusiastic wildlife photographer. His commitment to scientific wildlife management—further strengthened during the Ecological Census Techniques training at Mudumalai Tiger Reserve.