Training of Forest Personnel (Himachal Pradesh) for Population estimation of Rhesus Macaques

भारतीय वन्यजीव संस्थान
Wildlife Institute of India

Preface

The objective of this training manual is to communicate field-friendly standardized data collection protocols for the front line staff and officers of the forest department.

- Line transect methodology - Prashant
- Data sheets and allied discussions – Uddalak
- Use of instruments and locus app – Sayli
- Field Training and assistance during presentation – Dr. Sarvesh, Mariyam, Souritra, Harshita and Amritesh

POPULATION ESTSIMATION OF RHESUS MACAQUES

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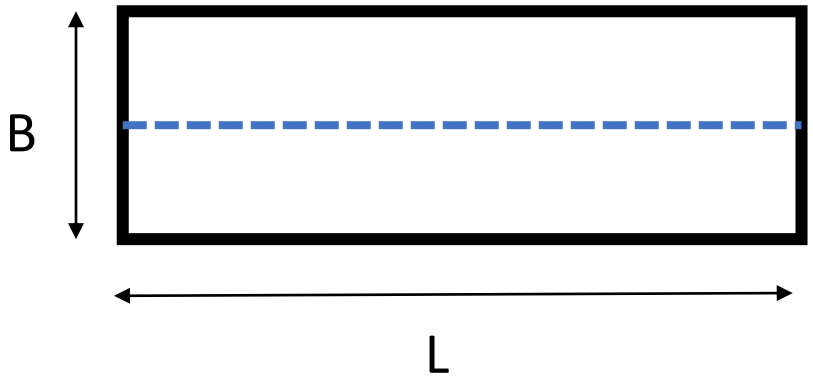
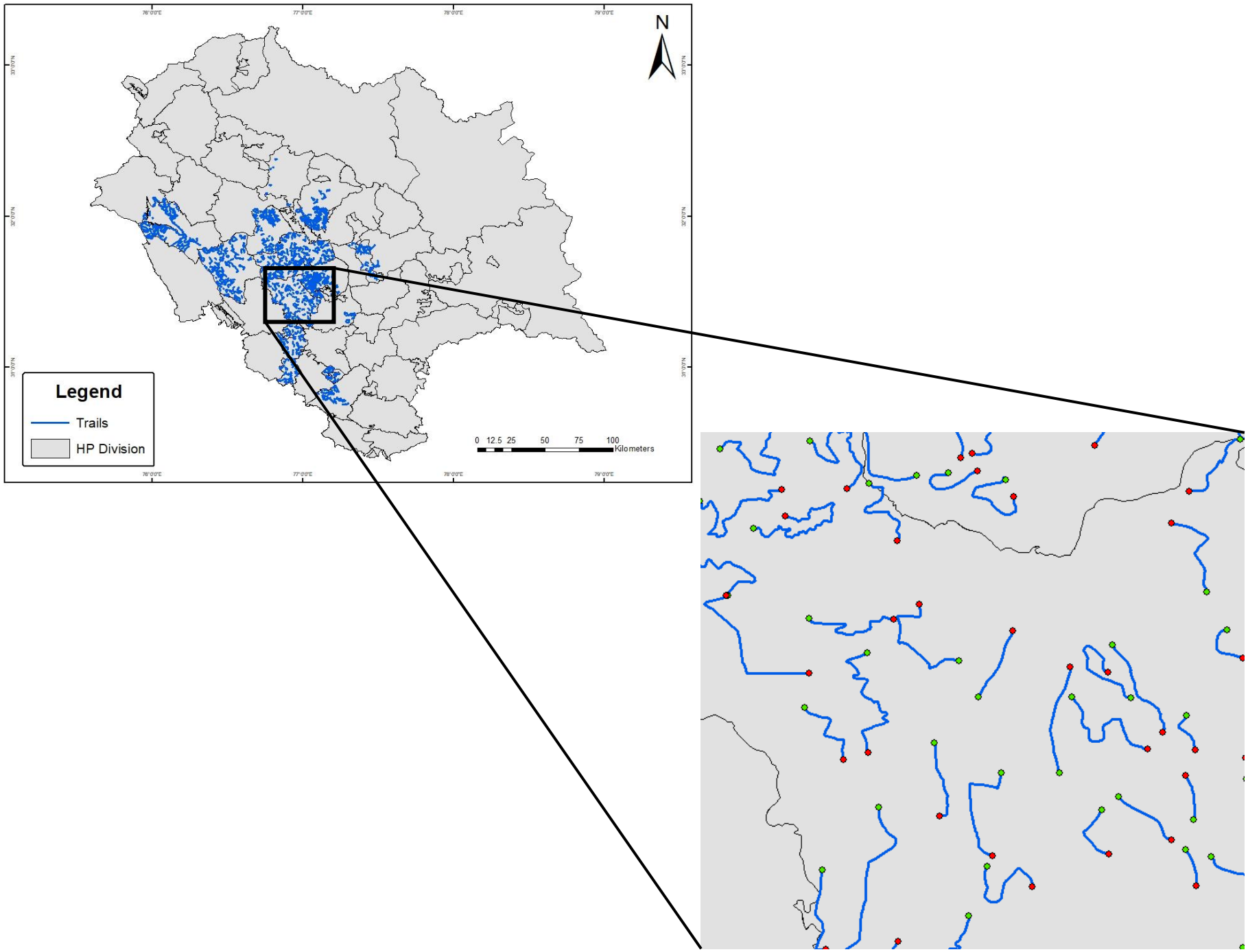
Introduction

- Line transect as a simple method to estimate population in an area.
- Beat in forests, village boundary, and block in cities as the basic sampling unit.
- Identifying 2-3 trails in each of these basic units.




N
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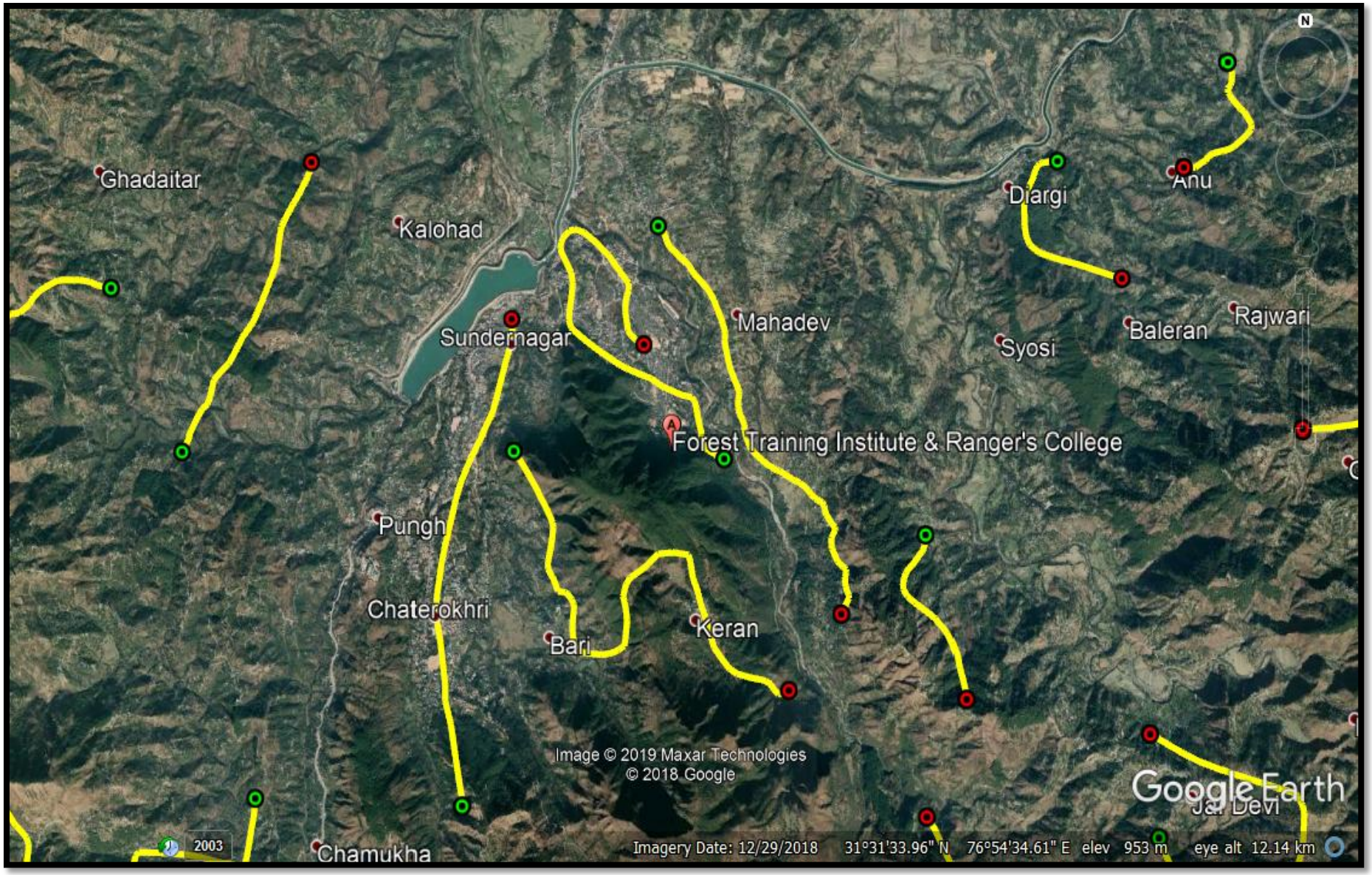
Ghadaitar
Kalohad
Sundernagar
Mahadev
Diargi
Anu
Baleran
Syosi
Rajwari
Forest Training Institute & Ranger's College
Pungh
Chaterokhri
Bari
Keran
Chamukha
Image © 2019 Maxar Technologies
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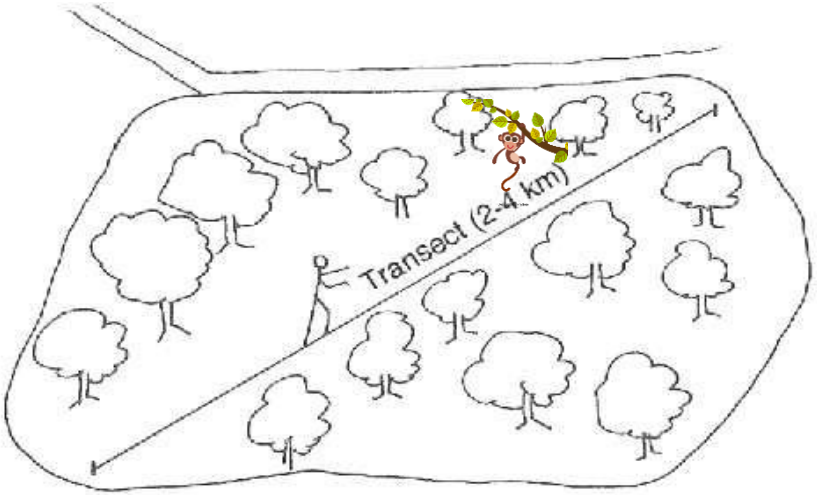
Google Earth
2003
Imagery Date: 12/29/2018 31°31'33.96" N 76°54'34.61" E elev 953 m eye alt 12.14 km

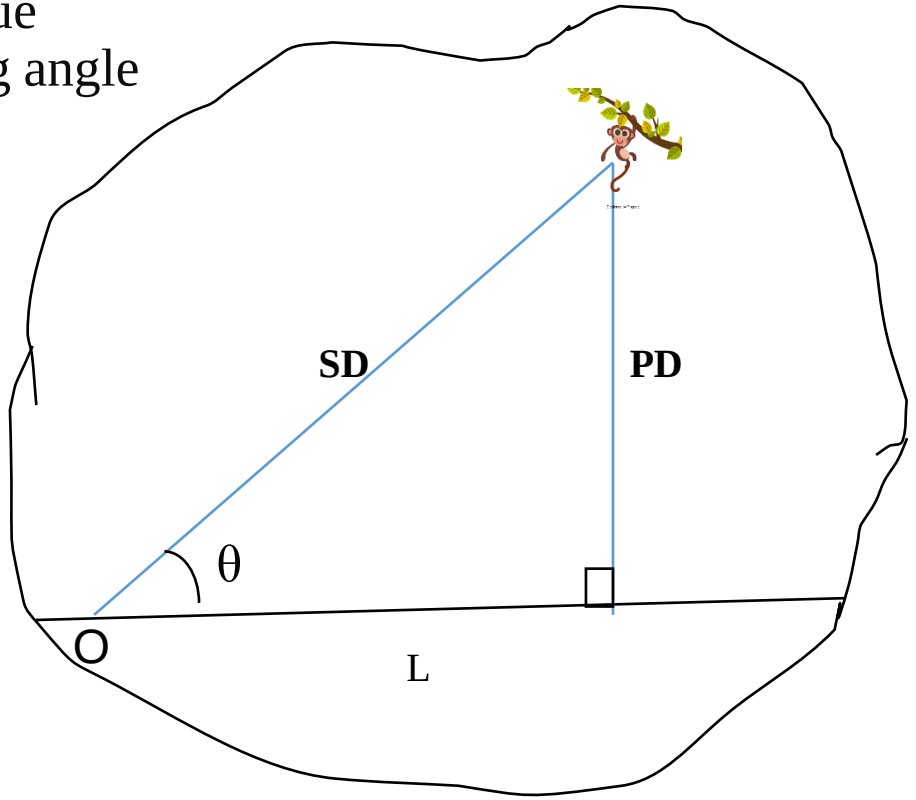
What is Line Transect ?

A line transect involves an observer moving along a predetermined route through the study area, recording the distances at which animals (individual/group) are seen.

PD= Perpendicular Distance
SD= Sighting Distance
O= Observer

L= Transect Line
= Macaque
θ = sighting angle





Calculating Density

$$D = \frac{N \times \bar{X}}{\sum l_i \times 2(W_{max} \times \beta)} \times \text{Area of region}$$

N = number of groups

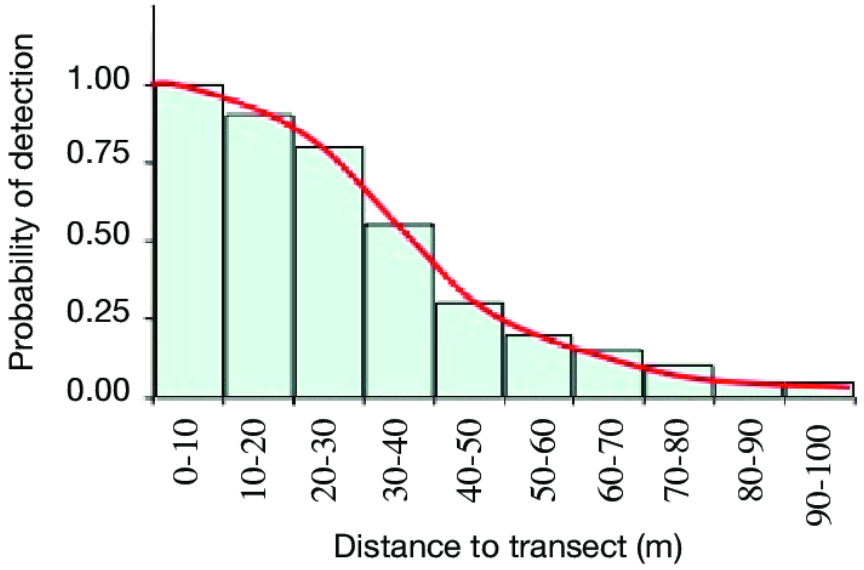
$\bar{X}$ = mean group size

$\sum l_i$ = summation of the transect length

W_{max} = maximum width up to which animals are recorded

β = detection probability

$(W_{max} \times \beta)$ = effective width strip



$$D = \frac{1000 \times 5}{500 \times 2(100 \times .5)} \times 50000 \text{ sq. km}$$

$$= \frac{5000}{500 \times 2(50)} \times 50000 \text{ sq. km}$$

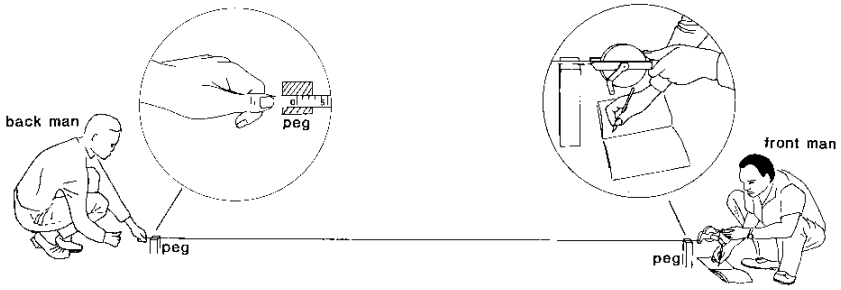
= 5000 macaques in 50,000 sq. km

DATASHEET 1a: Line transect

Date: ……..... Observer name: ..... Start Time: ..... End Time: .....
Beat/village/block name: ……
Transect ID: …… Total Length: ……Km
Begin GPS: Lat:…… (N), Long: …… (E) End GPS: Lat: ..... (N); Long: ..... (E)
Weather:……

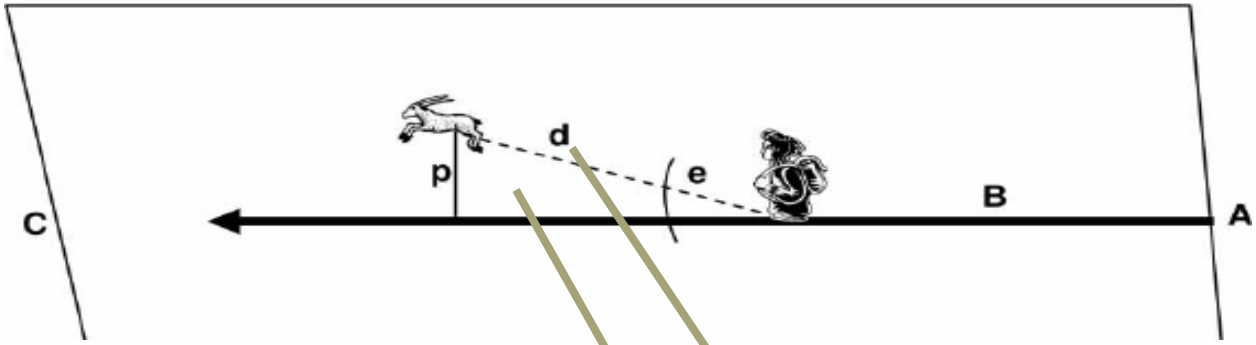
S.No.	Time of sighting	Total number	Number of							Walk bearing	Animal		Latitude of observer	Longitude of observer	Habitat type/Forest terrain
			AM	AF	SM	SF	S Un.	Inf	Unknown		Bearing	Distance			

Instruments used in line transect



Compass for estimating bearing

- Compasses are designed for determining angle or bearing or any object relative to true North.
- This will be used to measure walk bearing and animal bearing.



DATASHEET 1a: Line transect

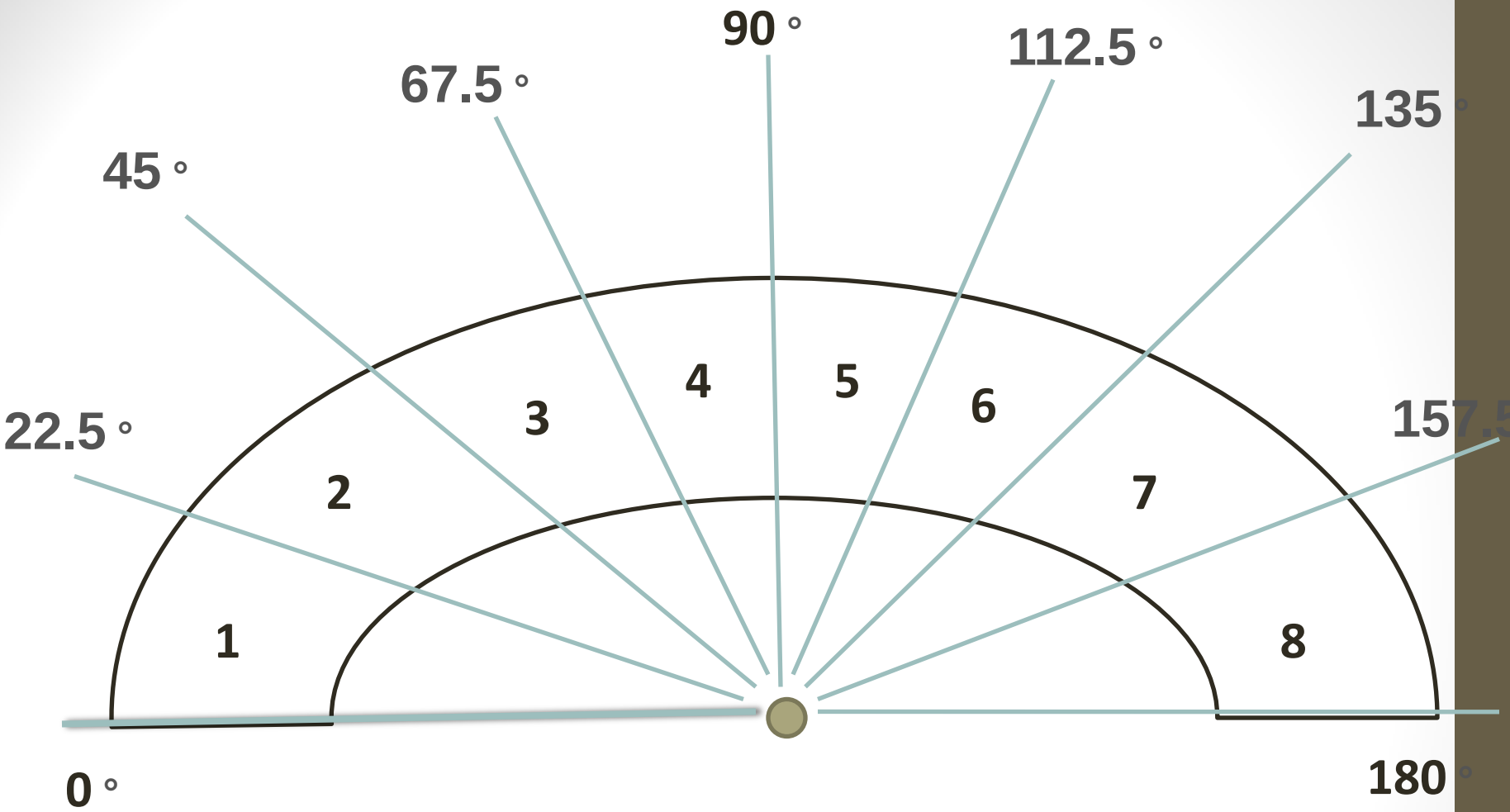
Date: ..... Observer name: ..... Start Time: ..... End Time: .....

Beat/village/block name: ..... Transect ID: ..... Total Length: .....Km

Begin GPS: Lat:..... (N), Long: ..... (E) End GPS: Lat: ..... (N); Long: ..... (E)

Weather:.....

S.No.	Time of sighting	Total number	Number of							Walk bearing	Animal		Latitude of observer	Longitude of observer	Habitat type/Forest terrain
			AM	AF	SM	SF	S Un.	Inf	Unknown		Bearing	Distance			



Macaque Position and Bearing without compass or smartphone

Distance estimation

DATASHEET 1a: Line transect

Date: ..... Observer name: .....
Beat/village/block name: .....
Begin GPS: Lat:..... (N), Long: ..... (E)
Weather:.....

Start Time: ..... End Time: .....
Transect ID: ..... Total Length: .....Km
End GPS: Lat: ..... (N); Long: ..... (E)

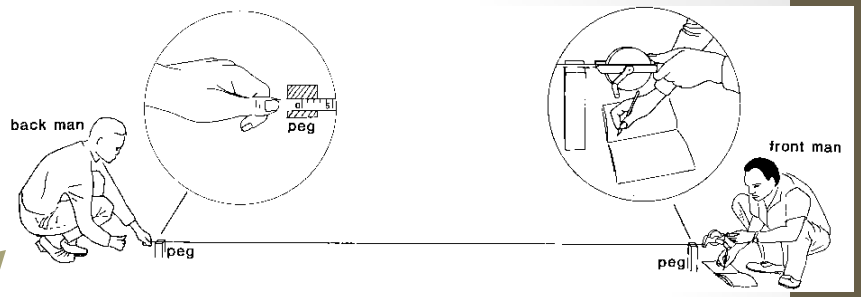
S.No.	Time of sighting	Total number	Number of							Walk: bearing	Animal		Latitude of observer	Longitude of observer	Habitat type/Forest terrain
			AM	AF	SM	SF	S Un.	Inf	Unknown		Bearing	Distance			

Rangefinder

- A rangefinder is a device that measures distance from the observer to a target, in a process called ranging.
- This will be used to measure distance of animal from observer.

Ocular estimation

- Distance is estimated visually on the basis of previously marked accurate distances
- This is for observers who do not have rangefinders



DATASHEET 1d: Estimating distance through ocular method

Observer name: .....

Before training

Date: .....

S.No.	Distance estimated	Actual distance

After training

Date: .....

S.No.	Distance estimated	Actual distance

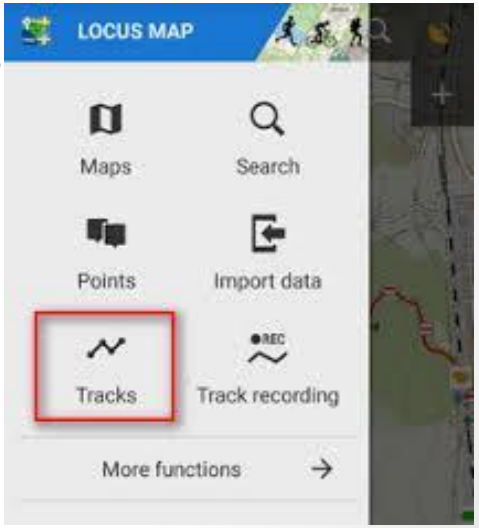
After completion of all trail walks

Date: .....

S.No.	Distance estimated	Actual distance

Locus-Navigation app

- **Locus Map** is a multi-functional Android navigation app adding advanced online and offline GPS capabilities to Android devices.
- This will be used for mapping trails, recording waypoints, and sharing this data through email.
- The biggest advantage of this app is that it does not require internet connection for functioning
- Location sharing must be kept on whenever Locus is used.



- Download Locus application on your phone through the Play Store.

- Open Locus, go to Settings, and make sure that Latitude and Longitude are in degree decimals for e.g. 30.228221 and 77.82341, and not in degree-minutes-seconds.

- If shape files are available, you can import shape files of study area in Locus. For importing .kml or .kmz files, go to import files->import from dropbox->select required files-> import->files will load in Locus. This step is not compulsory.

- Before starting to walk the trail, open Locus -> Tracks ->Track recording-> click on start icon->start walking your trail->click on stop icon after trail ends->Track will be recorded in your phone-> save the track by trail ID_beat/block.

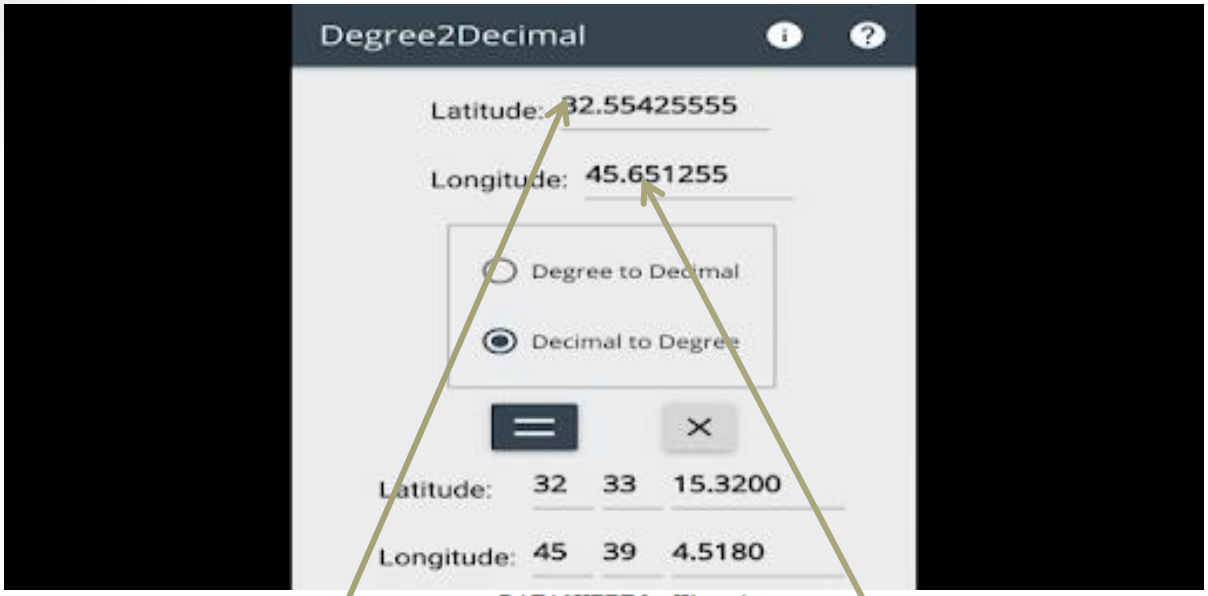
- Every 5 mins while walking the trail, create a waypoint as follows. In Locus->go to points->create new point->save as “trailID_beat/block_waypointnum” to the point->save point

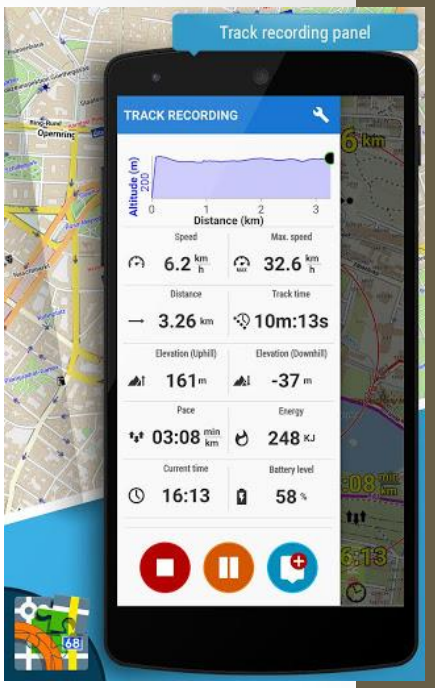
- In order to share trails and waypoints files->Go to menu-> click on share icon-> select the files->share via email-> type the respective email id -> share

- All saved tracks and points are automatically stored as .gpx files, and can be shared via email.

- These .gpx files can be then imported in to Google Earth for mapping and further analysis

- Make sure your phone screen is not switched off otherwise locus will stop track recording





DATASHEET 1c: Waypoints

Date: ..... Observer name: .....
Beat/village/block name: .....
Begin GPS: Lat:..... (N), Long: ..... (E)
Weather:.....

Start Time: ..... End Time: .....
Transect ID: ..... Total Length: .....Km
End GPS: Lat: ..... (N); Long: ..... (E)

S.No.	Latitude of observer	Longitude of observer

S.No.	Latitude of observer	Longitude of observer

Taming the Datasheets...

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DATASHEET 1a: Line transect

Date: ……..... Observer name: .....

Beat/village/block name: ……

GPS: Lat:…… (N), Long: …….. (E)

Weather:……

Start Time: ..... End Time: .....

Transect ID: …… Total Length: ……KmBegin

End GPS: Lat: ..... (N); Long: ..... (E)

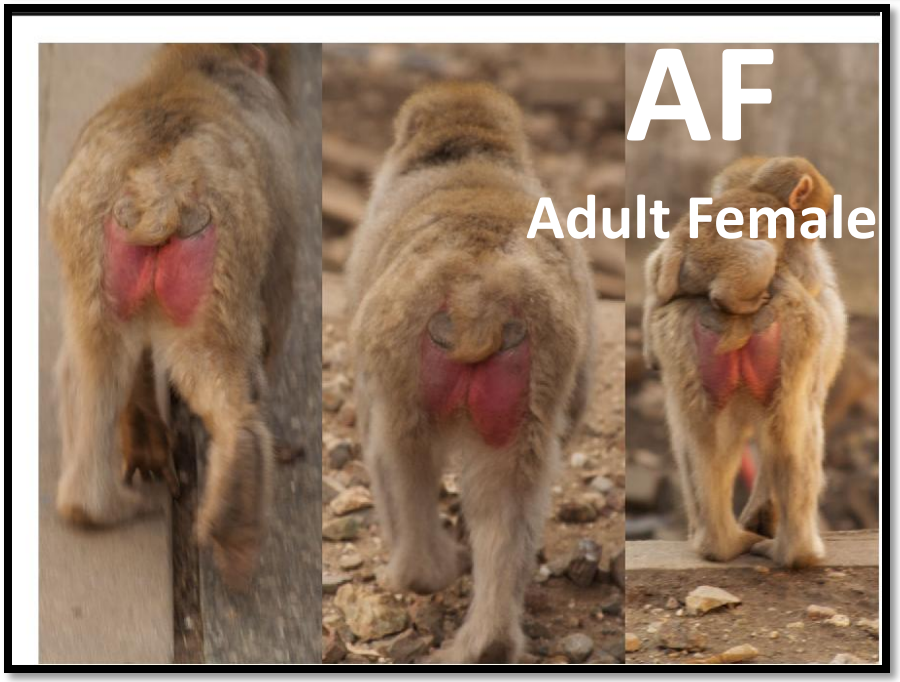
S.No.	Time of sighting	Total number	No. of Animals							Walk bearing	Animal		Latitude of observer	Longitude of observer	Habitat type/Forest terrain
			AM	AF	SM	SF	SU	Young	Unknown		Bearing	Distance			

Rhesus Age-Sex Class Identification:

Age-Sex class	Definition
Adult Male	Prominent scrotum.
Adult Female	Prominent nipples, red anogenital regions.
Juvenile (includes sub-adults)	Independent, weaned, larger in size than infants but smaller than adults, lack of red sexual skin in anogenital regions.
Infants	Generally dependent upon the mother, unweaned and usually carried by the mother during group progression.


AM
Adult Male


AM
Adult Male


AF
Adult Female


AF
Adult Female


JUV
Juvenile


INF
Infant

DATASHEET 1B: Line transect (Phase 2)

Date: ……..... Observer name:..... Start Time:..... End Time: .....

Beat/village/block name: …… Transect ID: …… Total Length: ……KmBegin

GPS: Lat:…… (N), Long: …….. (E) End GPS:Lat:..... (N); Long: ..... (E)

Weather:……

S.No.	Time of sighting	Total number	No. of Animals							Walk bearing	Animal		Latitude of observer	Longitude of observer	Habitat type/Forest terrain
			AM	AF	SM	SF	SU	Young	Unknown		Bearing	Distance			


FLORIDA
Traveler

DATASHEET 1c: Waypoints

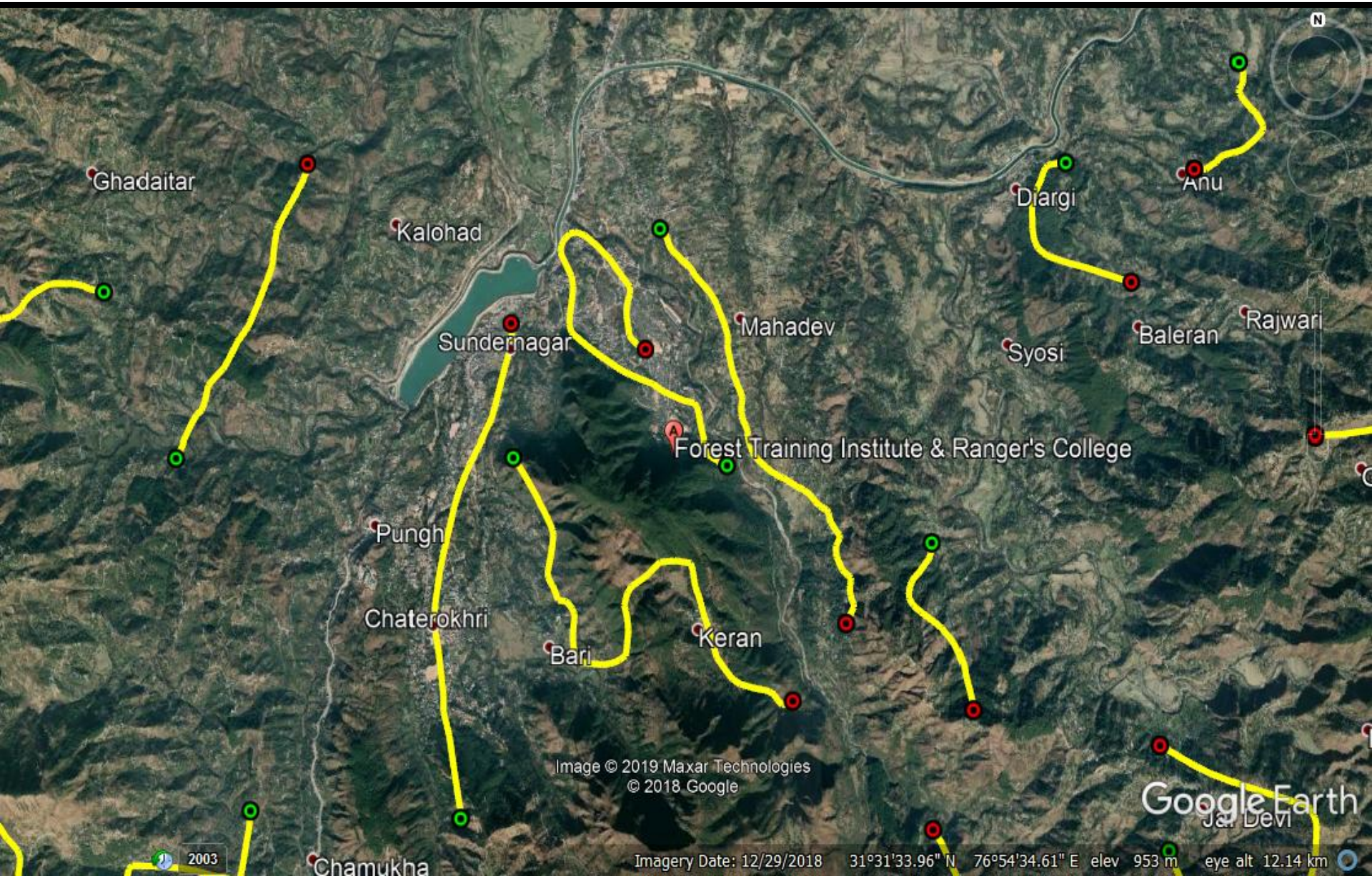
Date: ..... Observer name: .....
Beat/village/block name: .....
GPS: Lat:..... (N), Long: ..... (E)
Weather:.....

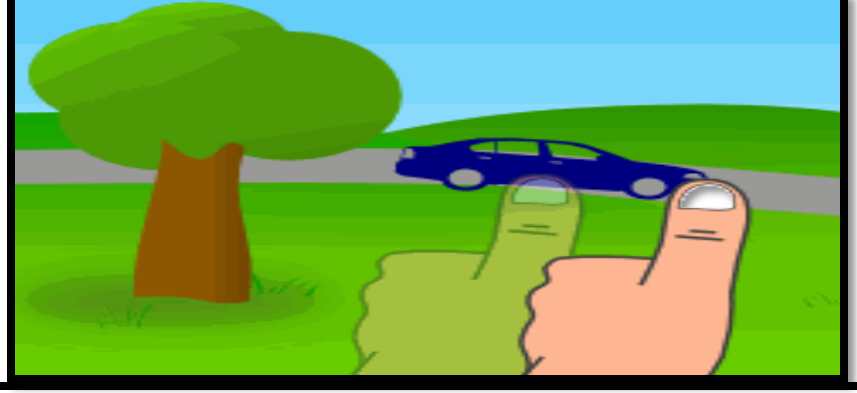
Start Time: ..... End Time: .....
Transect ID: ..... Total Length: .....KmBegin
End GPS:Lat: ..... (N); Long: ..... (E)

Time	Latitude of observer	Longitude of observer

Time	Latitude of observer	Longitude of observer

Trails & Transects...





DATASHEET 1d: Estimating distance through ocular method

Observer name: .....

Before training

Date: .....

S.No.	Distance estimated	Actual distance

After training

Date: .....

S.No.	Distance estimated	Actual distance

After completion of all trail walks

Date: .....

S.No.	Distance estimated	Actual distance

DATASHEET 2a: Vegetation and habitat status (15 m radius plot)

Date: ..... Observer name: ..... Start Time: ..... End Time: .....

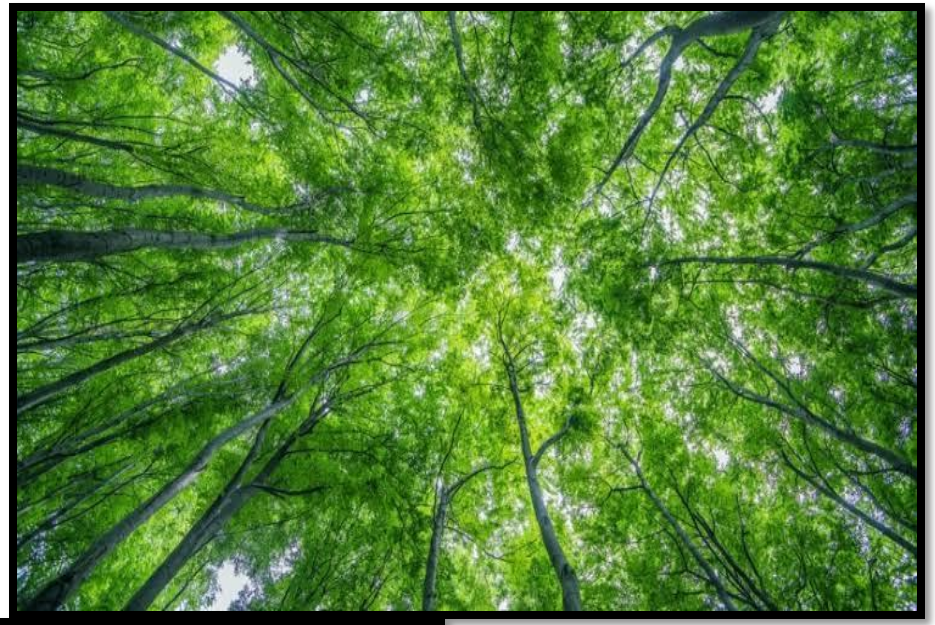
Beat/village/block name: ..... Transect ID: ..... Total Length: .....KmBegin

GPS: Lat:..... (N), Long: ..... (E) End GPS:Lat: ..... (N); Long: ..... (E)

Weather:.....

Plot	Canopy cover (0 – 100%)	Tree species (descending order of dominance)					Shrub species (descending order of dominance)					Shrub abundance (0-absent to 4 –high)	Weed/Invasive species (descending order of dominance)			Habitat type/Forest terrain
		1	2	3	4	5	1	2	3	4	5		1	2	3	
1																
2																
3																
4																
5																

Tree Canopy Cover…



DATASHEET 2b: Vegetation and habitat status (1 m radius plot)

Date: …… Observer name: …… Start Time: …… End Time: ……

Beat/village/block name: …… Transect ID: …… Total Length: ……KmBegin

GPS: Lat:…… (N), Long: …… (E) End GPS:Lat: …… (N); Long: …… (E)

Weather:……

Plot	Litter (%)	Ground cover (the below 5 columns should total 100%)					Grass species (descending order of dominance)			Herb species (descending order of dominance)		
		Dry grass	Green grass	Herbs	Weeds	Bare ground	1	2	3	1	2	3
1												
2												
3												
4												
5												

DATASHEET 3: Human disturbance and macaque interaction

Date: ……..... Observer name: .....

Beat/village/block name: ……

Are there signs of wood cutting/lopping/grass/other NTFP collection in this beat? ……

Are there garbage dumps on this beat? Low / Medium / High

Are there signs of loose/scattered garbage on this beat? …….

How many human settlements/houses are present in this beat? ……

Do humans willfully feed macaques on this beat/block? Yes/No

Are there temples on this beat/block?.....

… continued

Are there cases of macaque biting/snatching/aggression in this beat? Yes/No

If yes, rate severity of macaque conflict on a scale of 0 (least severe) to 5 (most severe) …….

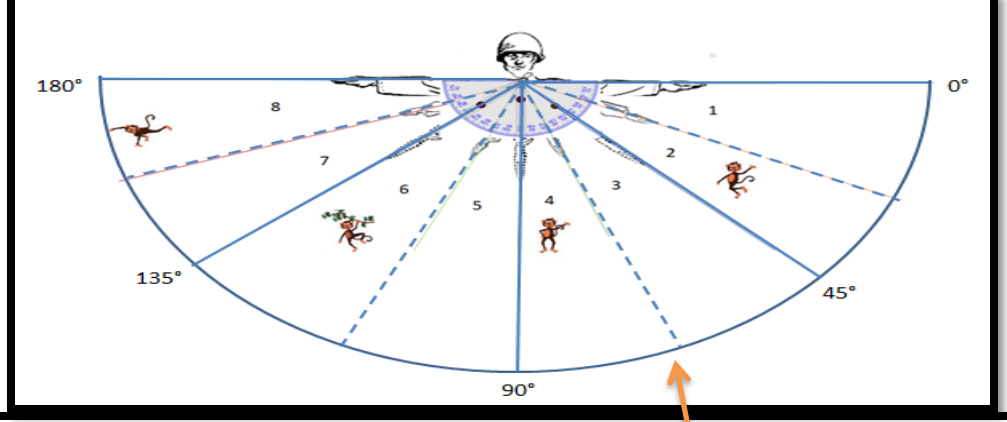
How many cases of macaque biting/snatching/aggression are reported per week/month, on average? ……

Is compensation provided for damage/injuries caused by Rhesus macaques? Yes/No

Have macaques been sterilised in this beat in the last 5 years? Yes/No If yes, how many?.....

Have macaques been shot (legally because of schedule V status) in this beat in the last 5 years? Yes/No If yes, how many?.....

Are there fruiting trees/orchards in this beat? Yes/No If yes, which fruit(s)?.....



DATASHEET 1b: Line transect (in case of no compass)

Date: ……..... Observer name: ..... Start Time: ..... End Time: .....

Beat/village/block name: …… Transect ID: …… Total Length: ……KmBegin

GPS: Lat:…… (N), Long: …….. (E) End GPS:Lat: ..... (N); Long: ..... (E)

Weather:……

S.No.	Time of sighting	Total number	Number of							Animal		Latitude of observer	Longitude of observer	Habitat type/Forest terrain
			AM	AF	SM	SF	S Un.	Inf	Unknown	Bearing	Distance			