



# FIELD GUIDE

MONITORING TIGERS,  
CO-PREDATORS, PREY  
AND THEIR HABITATS

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**NATIONAL  
TIGER  
CONSERVATION  
AUTHORITY**  
NEW DELHI

**WILDLIFE  
INSTITUTE  
OF INDIA**  
DEHRADUN

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## **PREFACE**

The objective of this field guide is to communicate field friendly standardized protocols for data collection for the frontline staff and officers of the forest department. The data, when analyzed would provide a scientific basis for assessing the status of tigers, other carnivores, prey species and their habitat. To this end the first four editions of 2005, 2009, 2013 and 2017 served their purpose. In this fifth edition, we incorporate the experience of the first three cycles of assessment for the entire country and moved to digital data entry in the field through mobile apps in MSTRIPES [Monitoring System for Tigers - Intensive Protection and Ecological Status]. It is crucial that the pulse of tiger source populations is kept by the management so as to detect declines and take remedial action in time. The periodicity of four years for assessing the status of tigers and sympatric carnivores at the scale of the entire country was rather long for monitoring source populations. We recommend that the source populations [Tiger Reserves and Protected Areas] be monitored twice in a year. Based on earlier experience some of the data forms are marginally modified to meet the data requirements for the country wide monitoring , also collection of data using M-sTRIPES mobile applications has been mandatory to promote error-free data collection. The entire set of protocols in this field guide need to be completed for source population monitoring while all, except information from track plots needs to be implemented for the country wide monitoring done every four years. Use of M-STRIPEs mobile application, GPS, Range Finder and Compass is essential.

The field guide serves as a cook book for data collection protocols on carnivore occupancy [form 1]. prey abundance [forms 2 & 4], human impacts on the habitat [form 3B] and habitat status [forms 3A & 3C]. A user friendly mobile app and desktop based analysis tool is provided separately in MSTRIPES to accompany this field guide in an attempt to make data entry error free and permit the wildlife managers to use their data locally for management purposes. When the protocols outlined in this field guide are followed and data is analysed, the wildlife manager will have reliable information on carnivore species occupancy in time and space [at the resolution of a beat and any higher scale]. abundance and change in prey species status, trends and areas of impact by human activities, and habitat status and changes therein over a specified timescale.

## **INTRODUCTION**

Monitoring tigers is a process, the end product of which is not only the number of tigers but an indication that there has been a change in number of tigers, with an understanding of the factors that have been responsible for this change. We are concerned, therefore, to use a methodology that will detect this change, establish its direction, and measure its extent and intensity. Often monitoring is confused with record keeping and data collection using a methodology. There has been considerable amount of field data recording of wildlife especially in Protected Areas for the past three decades. There is frequently a misconception that once the data are collected, statisticians will analyze the data and provide inferences that will be useful for conservation science and management. If the data collection and record keeping are not strictly uniform and standardised and are not also supported by full information on total survey effort, it becomes difficult, often impossible, to make comparisons or draw inferences. Thus, there is no substitute for an objective-oriented, well designed monitoring program that defines in advance the exact standard methods for data collection and record keeping. Here, foresight plays an important role in data analysis which is determined well in advance by the study design that specifically addresses the objectives of the monitoring program. By fixing the sampling units and methodologies since 2006 the national tiger monitoring surveys have achieved these objectives.

There are several manuals published for conducting tiger census or estimating their numbers. Many of these rely on acquired "expert" skills, while others need a high level of scientific and technical skill. There is no substitute for good scientific design in implementing an effective monitoring scheme for tigers and their habitats, but we believe that for such a scheme to succeed at the National level in India [or even at a landscape level] the vast resources of the Government machinery and sheer manpower of the forest department needs to be harnessed. Individual scientists, ecologists, and scientific organizations have developed effective monitoring schemes for individual tiger reserves, or tiger population estimation methods, but to maximize the contribution to tiger conservation, monitoring methods; must become institutionalized within the system responsible for implementing tiger conservation. Institutionalization of these protocols and monitoring designs is currently possible only when the Forest Department is a major stakeholder in implementing these protocols.

Here lies the need for a simple, field friendly but scientifically sound protocol that requires minimal technical skill for collecting the required data to address the objectives of the monitoring program. Since monitoring would need to be done in all tiger habitats including reserve forests and revenue forest lands, the effort and time investment needed for data collection should be such that it does not become a burden and is done with enthusiasm. At the same time the data generated by these simple protocols should meet the needed scientific

rigor for analysis and appropriate inferences. Since, most forests in India still have the old tradition of maintaining compartment boundaries and beat guards still patrol their beats, we have considered the beat [composed of one to several compartments) as the unit for sampling. Thereby systematically distributing the sampling units throughout the tiger habitat. Where the beat system is not in place or is defunct, we propose to rejuvenate it, or to delineate sampling units of 15-20 km<sup>2</sup> of habitat blocks on a 1 :50,000 scale map based on natural boundaries.

The protocols detailed in this manual are extremely simple and do not require any high level of technical skill - persons collecting data should be literate to a point of being able to write and count. The maximum required of some of them is that they would need to learn to use the M-STrIPES mobile application for data collection. The data generated would be such that they would permit scientifically reliable inference regarding current tiger status, population trends, habitat, and prey status with a high level of spatial resolution.

Needless to say, the inference drawn from any data depends on the authenticity and sincerity of data collection and reporting. By making the protocols and forms very simple and easy, stressing not the number of animals or tigers, but more on signs (and therefore occupancy). and by making observers fill in the data directly while still in the field, we have tried to minimize the tendency of reporting inflated numbers. We include a note of caution to the supervisory officers to instil into their staff the importance and value of reporting authentic data.

The explicit purpose of this field manual is that it will be used as a reference guide to ensure standardisation of data collection needed for monitoring tiger status and habitat across a large landscape. The simple text in English and regional languages and the diagrammatic presentation of protocols along with sample forms makes the manual useful for officers, but its primary users are likely to be the beat guards. The same set of protocols sampled at shorter intervals (annually or seasonally) would serve the purpose of monitoring source populations of tigers [Tiger Reserves & Protected Areas].

The protocols prescribed in this field guide are now part of the ecological module of MStrIPES. Implementation of MStrIPES would not only serve as a monitoring tool for the tiger and its habitats but would also serve to monitor the forests, their extents, and threats, prey species etc., in effect monitor the entire wilderness resource for which the tiger serves as a flagship. The system in combination with other MStrIPES protocols is sufficiently versatile for use in evaluating the status and habitat of several endangered species. The initial investment and effort seem formidable but once developed the system would pay dividends and require minimal resources to update at regular intervals. It would not only serve as a tool for monitoring wilderness resources but could in effect be used for diverse needs such as land use planning. This approach to land use planning would ensure a holistic evaluation of any change that is

to be introduced keeping in mind the economic, social, conservation and other values of the area.

MSTriPES would ensure that we keep the pulse of the tiger population and its habitat for the future generations to come. The system will collect and compile information in a scientifically structured manner. The system would enable us to detect site-specific changes in time to address them with timely intervention by management and policy decisions. The system would permit a comprehensive analysis at micro levels like a small patch of forest or at macro scale e.g. a conservation unit, or at mega landscape scale e.g. country wide analysis. With this system the information would be readily available to managers, scientists, and policy makers enabling them to make decisions on actual facts available from the field and not on educated guesses, unreliable information or expert opinion. This state of the art technology application of remotely sensed satellite data in GIS domain, combined with high spatial resolution field data for conservation in the sub-continent would ensure international recognition of our conservation efforts. It will help remove any doubt that may exist to our commitment to conserve the magnificent tiger and its last remaining habitats on this earth.

With four cycles of National assessment already done, this fifth cycle moves towards technologically advanced digital data entry and analysis through MSTriPES mobile app and desktop software.

## **01 SAMPLING FOR TIGER, LEOPARD, OTHER CARNIVORE AND MEGA HERBIVORE SIGN ENCOUNTER RATE**

To obtain data on the presence, absence and intensity of use of a beat by tiger, co-predators, and megaherbivores (elephant, rhino, wild buffalo, gaur) carnivores, we shall quantify the relative abundance of tiger, leopard, other carnivores, and megaherbivores signs in an area.

The following procedure needs to be followed for data collection:

- A beat will be considered as a sampling unit.
- Areas within the beat that have the maximum potential for tiger and leopard occupancy will be intensively searched.
- Since tigers and leopards have a tendency of using dirt roads, trails, foot paths, river beds and nullahas, these landscape features within the beat need to be searched intensively [Figure 1].
- While sampling for tiger and leopard signs, record should also be kept for signs of any other carnivore and megaherbivores that are encountered.
- One to three persons who know the terrain and habitat features of the beat should conduct the search for tiger and leopard signs. There should be 3-5 separate searches [in different compartments within the beat and/or at different times 1-5 days apart) with each search covering 5 km distance in areas having the best potential for tiger presence. It is important to record the distance covered and the time spent during each search separately [in the form-1) and accurately. If time is spent resting or in other activities while conducting the search, this duration should be reported separately. The GPS coordinate of the beginning point of each search path should be recorded. Within all Protected Areas and territorial forests where GPS units are available, GPS coordinates need to be recorded every 20 minutes.
- The total minimum distance covered while searching for tiger and leopard signs should be 15 km per beat.
- Tiger, leopard other carnivores, and megaherbivore signs should be classified into the following categories
  - 1) pugmarks/foot print trails
  - 2) scat/pellet (old- dry with hair, bones/vegetation remnants; fresh- dry but intact with shiny surface; very fresh - soft, moist, and smelly)
  - 3) scrapes/ digging
  - 4) scent marks (spray/rolling)

5) rake marks on tree trunks

6) vocalisation

7) direct sighting

- In case of pug mark trails, each trail set is considered as one sign [not each pug mark as one sign]. In case a tiger [or other carnivore] continues to walk along a dirt road for a long distance (say 1 km). then this should be considered as one sign, and a comment recorded in the remarks section of the data regarding distance covered by a pug mark trail of a single tiger.
- Tiger and leopard signs if encountered outside of the sampling route should also be recorded with GPS coordinates (if available] and with appropriate comments.
- Special emphasis should be given to sign of tigress & leopards with cubs, and any authentic evidence of tiger cubs [sightings of cubs, lactating tigress, tracks, etc.] obtained within the past twelve months should be mentioned in the data sheet.
- The number of livestock that are killed by predators within the past three months needs to be recorded in the questionnaire following the data sheet.
- It is important to report data sincerely. It is likely that there may be reliable information that tiger/leopard is present in the beat being sampled, but no tiger/leopard signs are recorded during the intensive search survey. In such cases, mention should be made in the remarks column of the data sheets. However, failure in obtaining tiger sign from a beat is equally important as recording tiger/leopard signs and for appropriate analysis of this data the actual data should be reported.
- Periodicity: All forested beats in tiger landscapes (Tiger Reserves, Protected Areas, Reserve and Protected Forests, Revenue Forests] will be sampled once in four years. All source populations of tigers (Tiger Reserves and Protected Areas] will be sampled with this protocol twice in a year (summer and winter].

**DATA SHEET FOR TIGER, LEOPARD, OTHER CARNIVORE & MEGA HERBIVORE SIGN ENCOUNTER RATE**

**FORM-1**

Forest Division: Start Time: Starting Latitude: N End Latitude: N Total distance covered: Km	Range: End Time: Starting Longitude: E End Longitude: E Time spent in other activities [resting etc.]:	Beat: Date: Trail ID:
--	--	-----------------------------

Team Members	Name	Designation	Phone No.
1			
2			

S.No.	Time	Latitude			Longitude			Sign Type	Species	Age of Track/Sign**	Remarks
		Deg.	Min.	Sec.	Deg.	Min.	Sec.				

In case of direct sighting of animals please note down individual number, age & sex of the animals (if identifiable) in remarks

\*Sign types-: Scat/Pellets/Dung-SCT/PLT/DNG, Pugmark\_Track - PT, Vocalization-VG, Rake-RK, Scrape-SCR, Rolling-RL, Spray-SPR, Digging-DIG, Kill- K, Scat & Scrape- SS

\*\* Age of Track & Sign : Very Fresh- VF, Fresh- F, Old-0, Very Old- VO

Records signs of Mega Herbivores [Elephant, Gaur, Rhino & Water Buffalo]

**Note:** 1. If you get more sign than these, then enter it on another datasheet.

1] Has any tigress with cubs been reported during the past 12 months

Yes [ ] / No [ ]

Approx. Date/Month:

a] Seen by staff [ ]

b] Pugmarks [ ]

c] Reported by local person [ ]

d] Seen by official [ ]

How many cubs:

Approx. age of the cubs:                  months

2] In case tigers are known to be present in the beat, but no sign was obtained during the sampling period then mention on what evidence was this conclusion made

a] Pugmark [ ]

b] Direct sighting [ ]

c] Scat [ ]

d] Other sign [ ]

Approx. Date/ Month:

Tiger presence was last recorded in the beat:

3] Has any leopard with cubs been reported during the last 12 months:

Yes [ ]/No [ ]

Approx. Date/Month:

a] Seen by staff [ ]

b] Pugmarks [ ]

c] Reported by local person [ ]

d] Seen by official [ ]

How many cubs:

Approx. age of the cubs:                  months

4] In case leopard are known to be present in the beat, but no sign was obtained during the sampling period then mention on what evidence was this conclusion made

a] Pugmark [ ]

b] Direct sighting [ ]

c] Scat [ ]

d] Other sign [ ]

Approx. Date/ Month:

Leopard presence was last recorded in the beat.....

5] How many livestock predation events has been recorded in the past 3 months, by Tiger....., by Leopard....., by Dhole.....,

By other carnivores [specify which carnivores] .....No. of events:.....

6] Comments & remarks: .....

## 02 SAMPLING FOR PREY SPECIES ABUNDANCE

This protocol outlines a simple method for quantifying ungulate abundance in an area based on visual encounters while walking along fixed line transects. The following procedure needs to be followed for data collection:

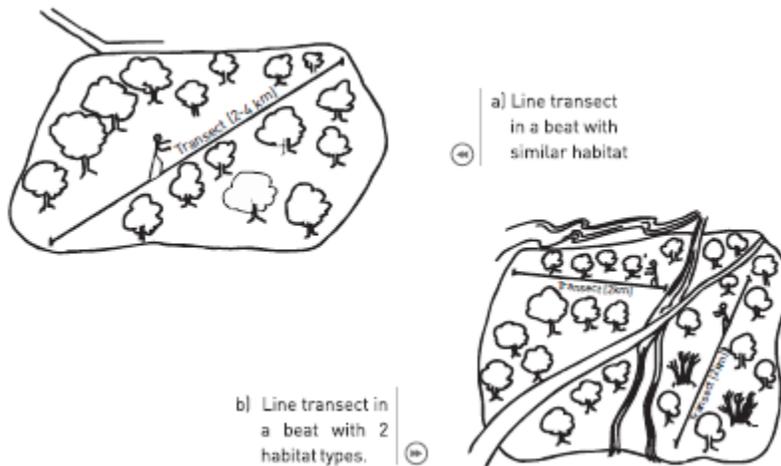
A beat would be considered as the unit for sampling.

After considering the shape, size, vegetation, and terrain type of the beat, a transect line of a minimum of 2 km and not exceeding 4 km will be marked for sampling.

The transect line should traverse similar habitat (broad vegetation types) as far as possible. If the beat is composed of 2 or 3 distinct vegetation types eg. Mixed teak forests comprising 40% of the beat and the remaining 60% comprised of miscellaneous forest with bamboo, then 2 separate line transects should be marked for sampling as shown in Figure 2b.

If the beat size is smaller, and 2 km line transect cannot be marked, then lay a transect of 1 km and walk that transect six times.

Figure 2, Marking transects in beat.



As shown in figure 2b, the line transect within a beat may be broken up into 2 or more segments, so each segment has a minimum length of 2 km and traverses' similar habitat.

Care should be taken that a line transect is not located near a busy road nor should it run parallel to a river or other features the landscape which may bias sighting of ungulates.

- For each transect the beginning and end point coordinates [Latitude and Longitude] should be recorded by a global positioning system [GPS] receiver.
- The broad forest type\* and terrain type\*\* that the transect traverses needs to be recorded.
- Each transect should be walked by 1-2 persons during the early morning hours [6:30 AM to 8:30 AM]. Preferably, one of the persons walking should be a good field person who is able to spot wildlife.
- A record should be kept of all herbivores [and other listed wildlife] seen during the walk in the prescribed format [see form! For each animal sighting the following needs to be recorded: 1] sighting number, 2] time of the sighting, 3] species (e.g., sambar, chital, wild pig etc.). 4] group size - number of animals of the same species in the group sighted, it is important to try to count the number of animals in the group as accurately as possible. Animals are considered to belong to two different groups if the closest animals from the two groups are separated by a distance of over 30m, 5] forest and terrain type where the animals were seen, 6] an estimate of the distance to the centre of the animal group from the observer, preferably recorded by a range finder, 7] the bearing of the centre of the animal group sighted, preferably recorded by a see through compass, and 8] GPS location on the transect line from where the animal was sighted.
- If possible, the number of young [fawns/calves less than 1 year of age] seen in the group should also be recorded.
- A broad habitat category (vegetation\* and terrain type\*\*) needs to be recorded for each sighting eg. 12 chital [10 adults and 2young] were seen at 6:40 am, in mixed teak forest, gently undulating terrain at 20 m distance and 175° bearing.
- Each line transect needs to be walked at least on three different mornings for estimating ungulate abundance during the country wide monitoring done every four years.

- For intensive monitoring of source populations (Tiger Reserves and Protected Areas] the line transects should be walked a minimum of eight times in summer and in winter.
- Habitat type should be one of the following: Agriculture/Plantation, Alpine meadows, Bamboo, Coniferous Forest, Desert rocky, Desert sandy, Dhonk forest, Fallow land, Himalayan broad leaved, Hollong forest, Mangroves, Miscellaneous dry deciduous forest, Miscellaneous evergreen forest, Miscellaneous moist deciduous forest, Miscellaneous semi-evergreen forest, Orchards, Pasture, Sal Forest, Scrub, Shala grassland, short grassland, tall grassland, Teak Forest, Thorn Forest, Riverine & Wetland.

\*\* Terrain type should be one of the following: Hilly, Plain, Steep, Undulating, Valley, very steep

## SAMPLING FOR PREY SPECIES ABUNDANCE

**FORM-2**

Forest Division: Transect ID: Start time: Start Latitude: N End Latitude: N Weather: Sunny [ ] / Cloudy [ ] / Rain [ ]	Range: Transect Replicate: End time: Start Longitude: E End Longitude: E	Beat: Transect Bearing: Habitat type*:	Date: Transect length [Km]: Terrain type**:
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Observers	Name	Designation	Phone No.
1.			
2.			

S.No.	Time	Latitude			Longitude			Species	Total Number (Adult & young)	Young	Angular Sighting Distance	Compass bearing		Habitat Type*	Terrain type **	Remarks
		Deg.	Min.	Sec.	Deg.	Min.	Sec.					Animal	Walk			

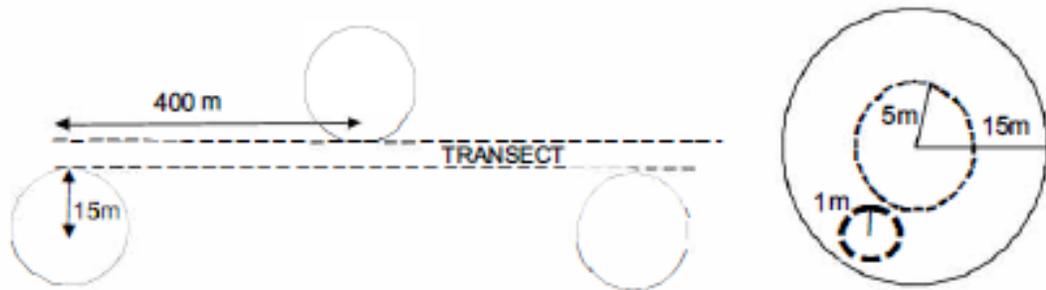
**Instructions:**

1. The start and end time of the transect must be recorded.
2. The format of GPS location should be in degree-minute-seconds.
3. The walk bearing and animal bearing should be written while walking the 2 km transect  
 (The walk bearing and transect bearing can be different if line transect is passing through hill or different terrain).

### 03-SAMPLING FOR VEGETATION AND HUMAN DISTURBANCE

To quantify the habitat parameters and determine levels of human disturbance, sampling will be done along the same line transect on which ungulate encounter rates were estimated. For economy of time and effort it would be possible to first sample the line transect during early morning hours for ungulate encounter rate and then while returning along the same line, sample for vegetation and human disturbance [and also for ungulate pellets - section 4). Sampling for vegetation and human disturbance [and ungulate pellets] will be done only once on a transect, in a season.

- Again, a beat will be the sampling unit, and sampling will be done along the established line transect.
- Vegetation and human disturbance would need to be sampled every 400 m along the transect. GPS coordinates for each plot should be recorded.
- For transects where the vegetation is cleared for walking, the observer should walk 15m perpendicular to the walking path and then sample the vegetation and human disturbance plot [Figure A]
- For each plot broad habitat type\* and terrain type\*\* should be recorded.



- Figure A: Placement of vegetation and human disturbance plots along the transect; and dimensions of sampling plots for trees and human disturbance signs [15 m radius], shrubs and weedy/invasive shrubs [5 m radius] and herbs, grasses and ground cover (1 m radius).

\*Habitat type should be one of the following: Agriculture/Plantation, Alpine meadows, Bamboo, Coniferous forest, Desert rocky, Desert sandy, Dhonk forest, Fallow land, Himalayan broad leaved, Hollong forest, Mangroves, Miscellaneous dry deciduous forest, Miscellaneous

evergreen forest, Miscellaneous moist deciduous forest, Miscellaneous semi-evergreen forest, Orchards, Pasture, Sal forest, Scrub, Shala grassland, Short grassland, Tall grassland, Teak forest, Thorn forest, Riverine & Wetland.

\*\*Terrain type should be one of the following: Hilly, Plain, Steep, Undulating, Valley, Very steep.

The vegetation and human disturbance would need to be quantified visually at the following categories for each plot:

**a) Tree species (15m radius plot):**

A circular plot of 15 m radius should be visually marked. The observer needs to enlist all the tree species [allvegetation > 6 ft/2 min height, including bamboo] and record number of every tree species. A maximum of 10 tree species should be recorded. Example: 4 trees of *Shorea robusta*, 2 trees of *Syzygium cumini*, 3 clumps of *Dendrocalamus strictus* etc. In the same plot, canopy cover for each plot should be recorded by visually estimating the percent visible open sky from five different locations along the diagonal of the plot and enter the averaged value.

**b) Shrub species (5m radius plot):**

A circular plot of 5 m radius should be visually marked. The observer needs to enlist all the shrub species [allvegetation in between 40 cm to 2.0 min height] and record percent cover of every shrub species. A maximum of 10 shrub species should be recorded. Example: 20% *Carrisa opaca*, 10% *Shorea robusta*, 5% *Ma/lotus philippensis* etc.

**c) Weedy/Invasive shrub species (5m radius plot):**

Within the same circular plot of 5 m radius, observer needs to enlist all the weedy/invasive shrub species [all vegetation in between 40 cm to 2.0 m in height] and record percent cover of every weedy/invasive shrub species. A maximum of 3 weedy/invasive shrub species should be recorded . Example: 25% *Lantana camara*, 10% *Pogostemon benghalensis*, 2% *Senna tora* etc.

**d) Grass and Herb species (1m radius plot):**

A circular plot of 1m radius should be marked. The observer needs to enlist the grass and herb species [all vegetation < 40 cm in height] in order of their abundance, such that the most abundant species is entered first followed by the less abundant one. A maximum of three grass and three herbs should be recorded .

**e) Ground cover (1m radius plot):**

Within the circular plot of 1 m radius used for recording grass and herbs, observer needs to record percentage of dry leaf Litter in the plot. This Litter should be removed and subsequently percentage ground cover of green grass, dry grass, herbs, weeds, and bare ground, needs to be recorded; this should add upto 100%.

**f) Human disturbance signs (15m radius plot):**

Within the circular plot of 15 m radius used for counting trees, observer needs to record 1] number of trees lopped, 2] number of trees cut, 3] evidence of grass and bamboo cutting (as present or absent]. 4] number of people seen from the plot, 5] number of livestock seen from the plot and 6] Livestock-human foot trails within the plot. Wood cutting/ Lopping by forest department should also be counted.

Observer needs to mention the number of permanent human settlements, human population, and Livestock population present in the beat (to the best of knowledge]. Observer needs to note if non-timber forest product (NTFP] is collected from the beat. If yes, which NTFP (maximum 4] and the magnitude of collection on a 5-point scale (0- no collection 4-high rate of collection]. Observer needs to note the fire extent in beat in past twelve months on a 5-point scale (0- no fire, 4-fire insubstantial area of beat].

**SAMPLING FOR VEGETATION & HUMAN DISTURBANCE**

**FORM – 3 A, B**

Observer name:	Latitude: N	Longitude :E
Date:	Division	Range:
Beat:	Transect ID:	Plot ID:
Habitat type:	Terrain type:	

<b>A: Plant species numbers in different sizes of plots</b>							
Trees (F-3A) (15m radius)		Shrubs (F-3A) (5m radius)		Shrubby weeds (F-3A) (5m radius)		Herbs (F-3C) (1m radius)	Grass (F-3C) (1m radius)
Species	Number	Species	Percent Cover	Species	Percent Cover	Species	Species
Canopy Cover (0.0-1.0):							

<b>B: Human Disturbance Sign in 15-Meter radius</b>					
No. of Tree Cutting	No. of Lopped Branches	No. of Human/Livestock trail	People seen	Livestock seen	Grass/Bamboo Cutting (Yes/No)

Are there any permanent human settlements in the beat? (Yes/No). If Yes, how many? \_\_ . Approximate human population \_\_\_\_ approximate livestock population \_\_ Cattle, \_\_ Goat/Sheep, \_\_ Other Livestock.

Is there NTFP collection in the beat \_\_ Yes/No. If yes, what NTFP is collected \_\_\_\_\_  
 Fire extent in the beat in past 12 months on a scale of 0-4, 0-No to 4 Very high \_\_\_\_\_

<b>C: Ground cover in 1-meter radius plot</b>					
Sum of the following 5 column should be 100%					
Dry Leaf Litter (%)	Dry Grass (%)	Green Grass (%)	Herb(%)	Weed(%)	Bare Ground (%)

Note: Bamboo more than 2 mis entered in "Tree" category less than 2m in "Shrub" category

## 04 SAMPLING FOR UNGULATE PELLETS/ DUNG

Ungulate abundance will also be indexed by enumerating their faecal pellets. This exercise will be done on the same line transect that has been sampled for ungulate encounter rate. To save time, this exercise could be done after the line transect has been sampled in the early morning for ungulate encounters and whilst doing the habitat and human disturbance sampling.

- At every 400 m along the transect (line of walk) the observer needs to sample an area of 2 m by 20 m, perpendicular to the transect for quantifying ungulate pellets. This is done by using the 2 m long stick held at the centre horizontally in his hand and by walking slowly looking left and right for 20 m. The plot is placed alternately to the right and left of the transect at every 400 m [see Figure 7).
- All ungulate pellets encountered need to be recognized to ungulate species and recorded in appropriate columns of the attached data sheet [see Appendix 31.
- The number of faecal pellets need to be counted. In cases where the pellets occur in large heaps, and if exceeds > 1000, then enter as 999 .
- In areas where small livestock like sheep and goat are known to be grazing, it is possible that faecal pellets of these can be confused with wild ungulates especially those of chital. In such areas, a mention needs to be made that goat or sheep graze the area.

# SAMPLING FOR UNGULATES

FORM-4

## PELLETS/DUNG

Name of Observer:	Date	Forest Division	Range
Beat:	ID No. of Line Transect:		

Plot	Chital	Sambar	Wild Pic	Nilgai	Gaur	Barasingha	Barking Deer	Hog Deer	Chinkara	Chowsingha	Mouse deer	Hare	Blackbuck	Wild buffalo	Elephant	Rhino	Langur	Peafowl	Cattle	Goat & Sheep	Other Domestic	Others/Unit.	
1.																							
2.																							
3.																							
4.																							
5.																							
6.																							
7.																							
8.																							
9.																							
10.																							

1. Do goat/sheep graze the sampled area? Yes / No.

Note: If, Pellets exceed 1000 then enter them as 999.

## PROTOCOL OF CARNIVORES SCAT & LARGE HERBIVORES DUNG COLLECTION

Collect scat samples of carnivores and dung of large herbivores, as and when encountered in field according to the following protocol.

1. Carry paper bags, zip lock bags whenever you go to field.
2. If you get
  - a. Very fresh/Fresh scat sample –Collect in whole bolus in zip locks with silica as mentioned below and rest of scat, put it in paper bags.
  - b. Old scat sample – collect in zip lock with silica and rest in paper bag.
  - c. Very old scat sample- collect it in paper bags only.
3. When you encounter a scat sample, collect a part of it in the ziplock bag as mentioned below.

Use an empty ziplock bag	
Fill approximately 1/5 <sup>th</sup> of the ziplock with silica gel.	
If the scat is intact, try and collect one or two intact bolous of scat in to the zip lock, otherwise collect approximated – 15 g. Do not touch the scat directly with your hand. Use a leaf/twig of stone to put the the scat into the ziplock. Seal tightly after removing any air.	

4. Write details of species, GPS location, place (State, Division, Range and Beat) and date of collection on the ziplock bags.
5. If you come across the carcass of any dead animal collect 5-10 gm of tissue for the reference. This can be collected in ziplocks with silica gel and later transferred to vials with ethanol.
6. Finally, send ziplocks, paper bags and /or vials with tissue samples, along with data sheet without any delay by post/courier to:

**Nodal Officer, NTCA-WII Tiger Cell, Wildlife  
Institute of India, PO box # 18, Chandrabani,  
Dehradun, Uttrakhand – 248001.**

# **Usage notes for using MStrIPES ECOLOGICAL Mobile application**

## I. Installation of MSTRIPES ECOLOGICAL application in mobile phone

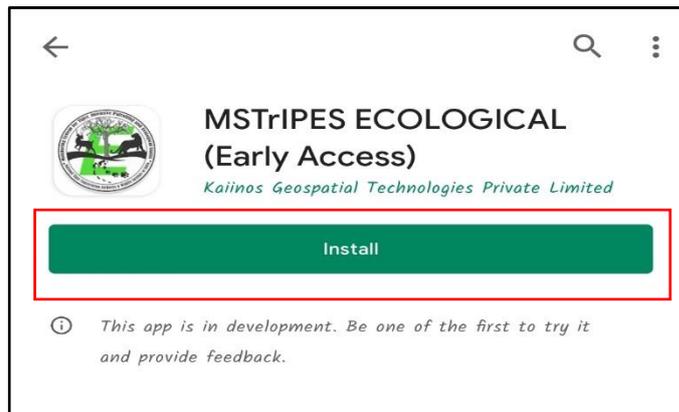
- To install the **MSTRIPES ECOLOGICAL** application, you must have an Android device, version 7.1.1 or higher. This application will not support iOS or Windows OS mobile devices.
- This application can be installed on the phone by two ways.

### 1. Download from Google Play Store. For this, user will require an Internet connection and a valid Gmail ID.

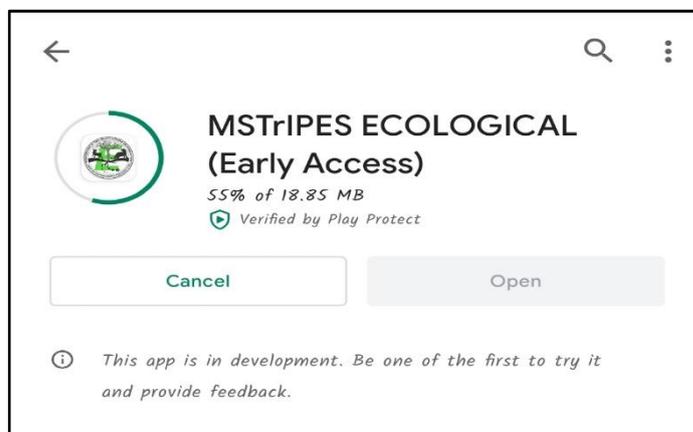
- a. Search in the search bar of Google Play Store for **MSTRIPES Ecological** Application.



- b. Select the MSTRIPES Ecological application and click on **INSTALL**.

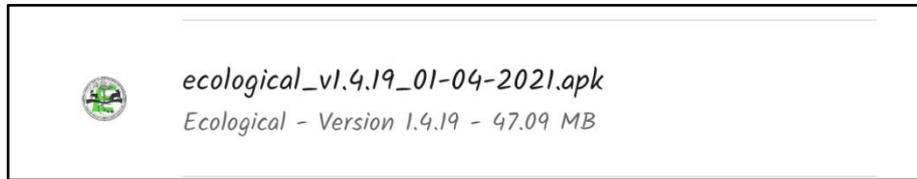


- c. Wait until the application is installed and close the Google Play Store after the process is complete (Do not click on Cancel).

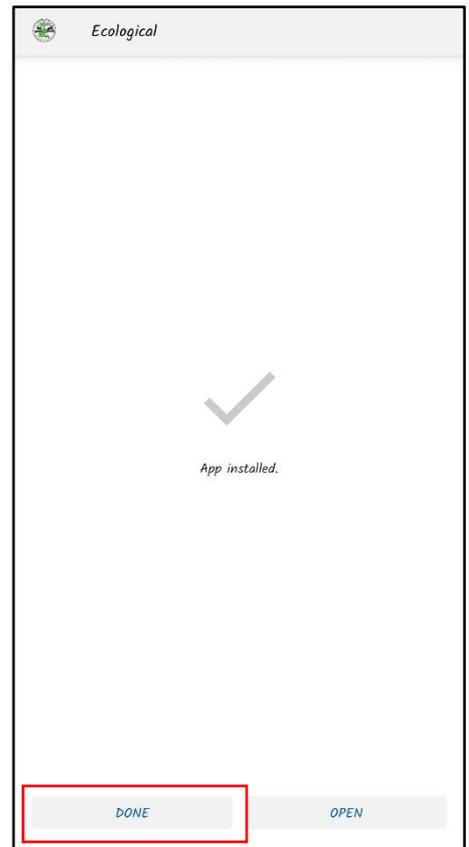
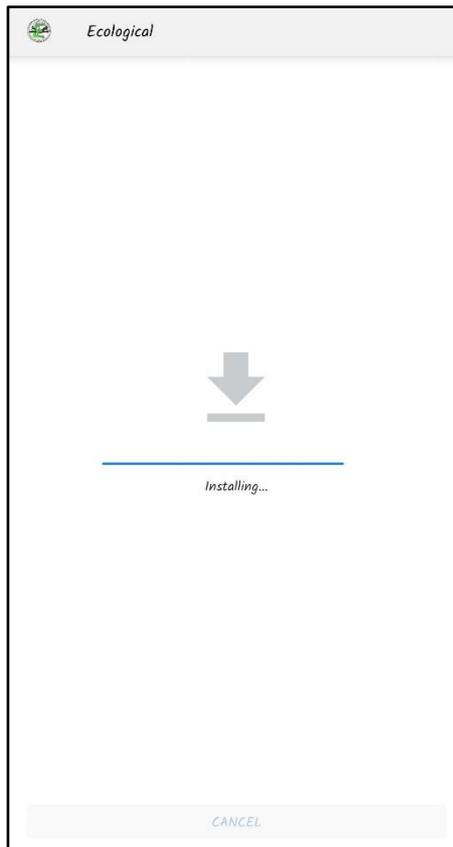
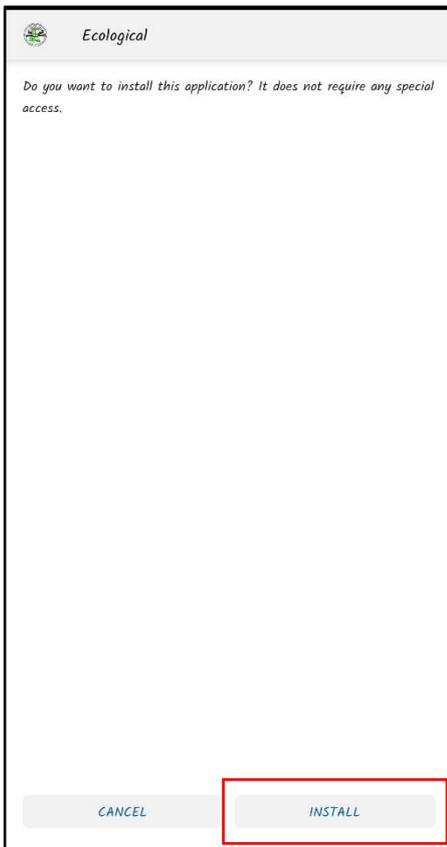


**2. Offline installation by APK file of MSTRIPES ECOLOGICAL application.**

- a. Keep the APK file of the MSTRIPES ECOLOGICAL application in your phone's file manager (Internal Memory or External Memory).



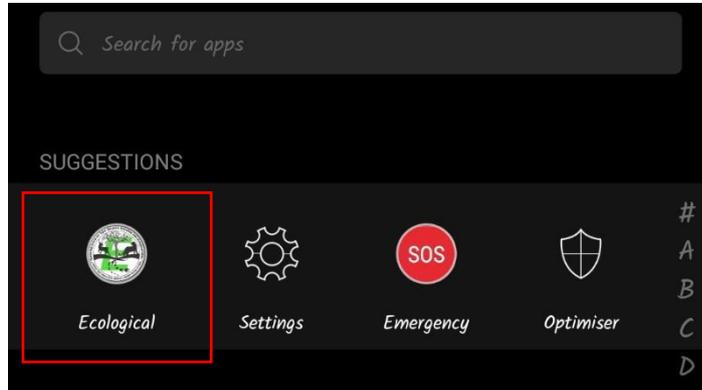
- b. Find the installer APK file in the phone's file manager and **INSTALL** the application. Wait until the installation completes. Once the installation has finished click on **DONE**.



## Steps for data collection using MSTRIPES ECOLOGICAL application

- Click on the **Ecological App** icon on the phone screen and provide all the necessary permissions it asks (e.g. Camera, Contacts, Location, and Storage) for smooth functioning of the app.

**Note:** If you decline the required permissions, the app will not work correctly.



- After the app starts, select the **Language** according to your convenience.

Select Language

हिन्दी	<input type="radio"/>
English	<input type="radio"/>
বাংলা	<input type="radio"/>
ଓଡ଼ିଆ	<input type="radio"/>
ಕನ್ನಡ	<input type="radio"/>
తెలుగు	<input type="radio"/>
தமிழ்	<input type="radio"/>
മലയാളം	<input type="radio"/>
मराठी	<input type="radio"/>
ગુજરાતી	<input type="radio"/>

- Fill in the required information and **register yourself** in the app. If all the information has been filled in correctly, then click **OK** on the confirmation message, otherwise click **CANCEL** and correct the information, and register.

State  
Uttarakhand

Designation  
Forest Guard

Name  
ABC XYZ

Mac ID  
acd54daf046266f9

Phone Number  
9876543210

REGISTER

State  
Uttarakhand

Designation  
Forest Guard

Name  
ABC XYZ

Mac ID  
acd54daf046266f9

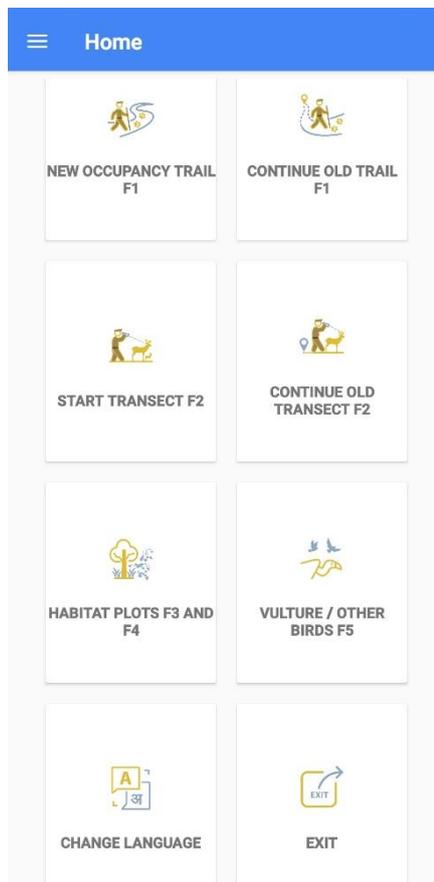
Phone Number  
9876543210

REGISTER

**Confirmation**  
Please ensure the information entered is correct! (No modification is allowed after submission).

CANCEL OK

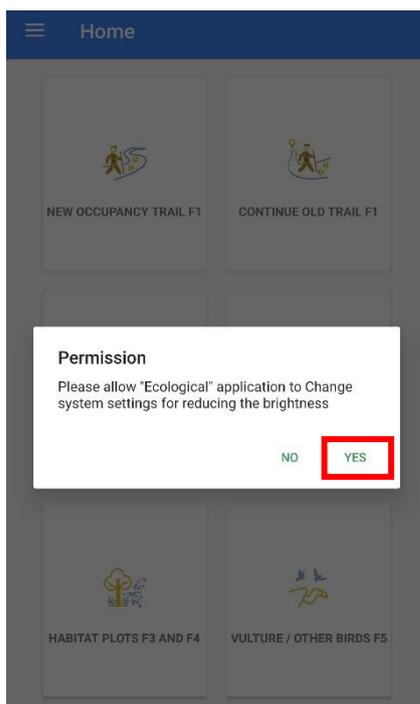
- After the registration is successful, this home page will appear on your screen.



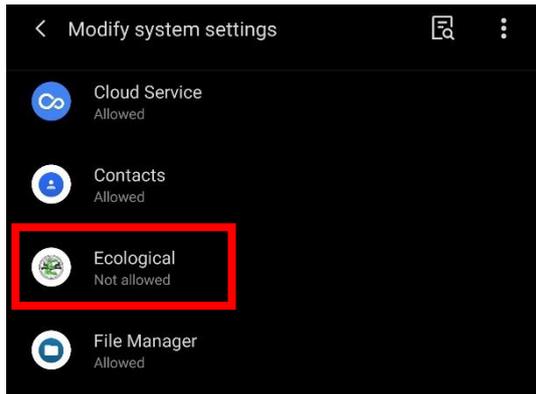
## Modify system settings (Battery optimization)

This is a user dependent/ optional permission which is required only to reduce the phone battery consumption while operating the application. It reduces the screen brightness when the Map Page Screen (described later in Occupancy F1/ Transect F2 section) is locked during occupancy trail/ transect.

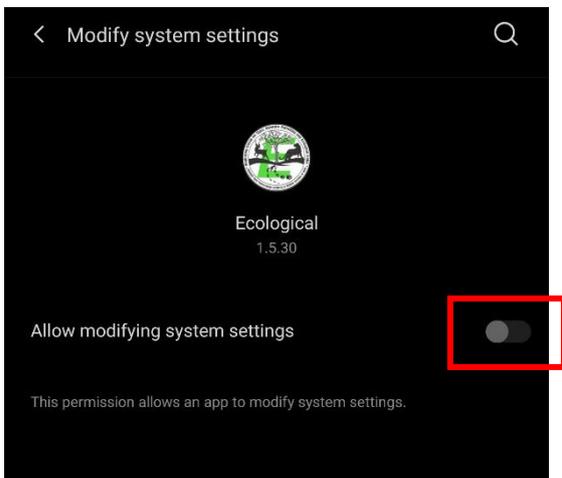
- User needs to tap on New Occupancy Trail F1/ Start Transect F2 button after the Home Page appears and it will prompt the user to Modify system settings.



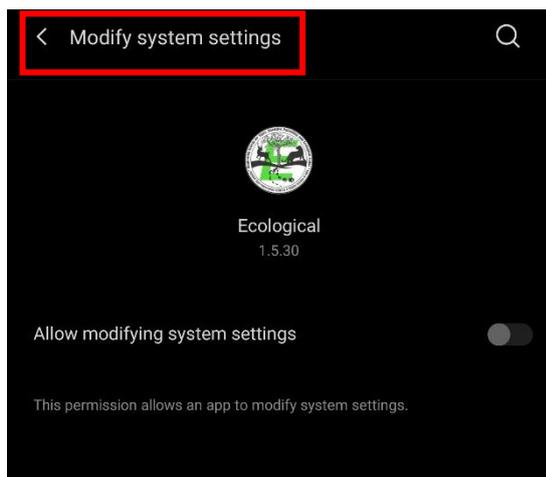
- This message box will appear upon tapping on the button, and user needs to select **Yes** in order to modify the settings.



- User needs to scroll and search for Ecological application and select the same.

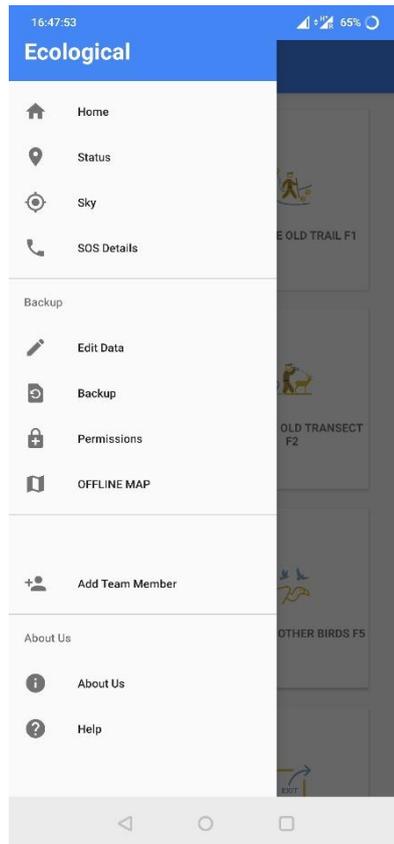


- User needs to allow the application to modify system settings by sliding the button.

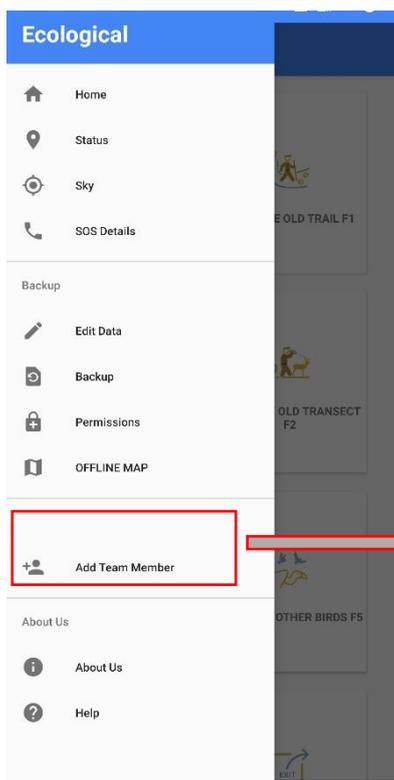


- Once permission is provided, user needs to select the Back button to return to Home page.

- Click on the menu bar button (☰) on the home screen before walking trail or transects.



- To add Team members to the list, click on **Add Team Member**, fill in the necessary information, and click **Save Details**. The name of all the persons added will appear on the list. **Note:** If there is no change in the team member, then do not add team member name in the list during every survey.



**Add Team Member**

*Member Name*  
ABC XYZ I

---

*DESIGNATION*  
Watcher

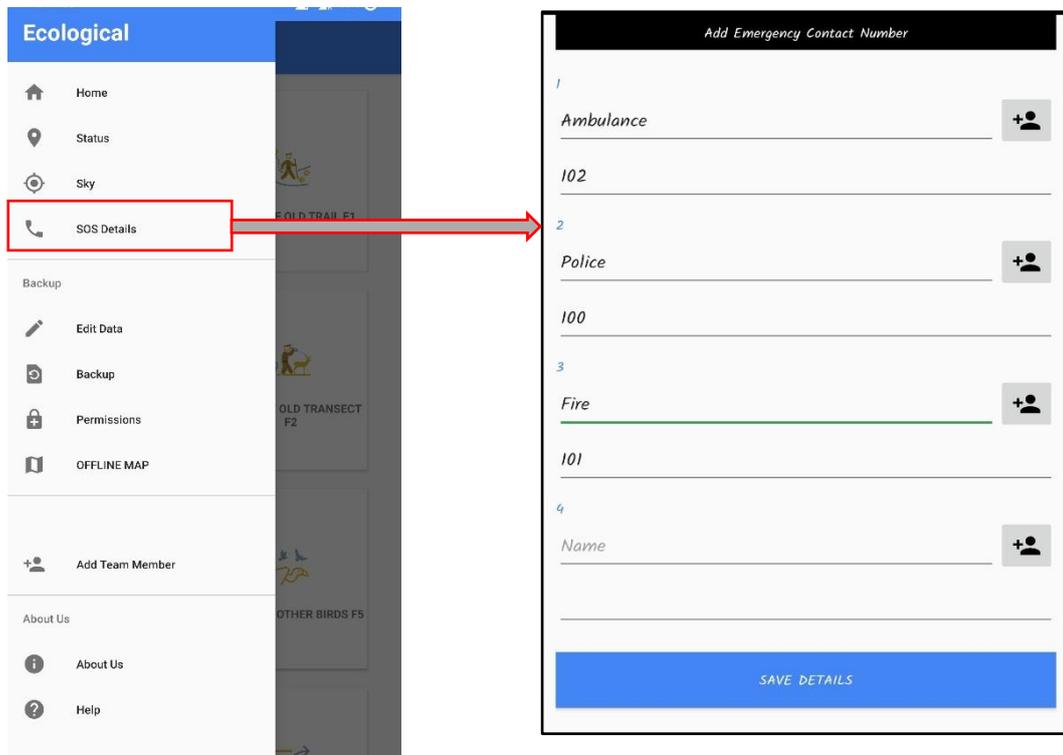
*Phone Number*  
9876543210

SAVE DETAILS

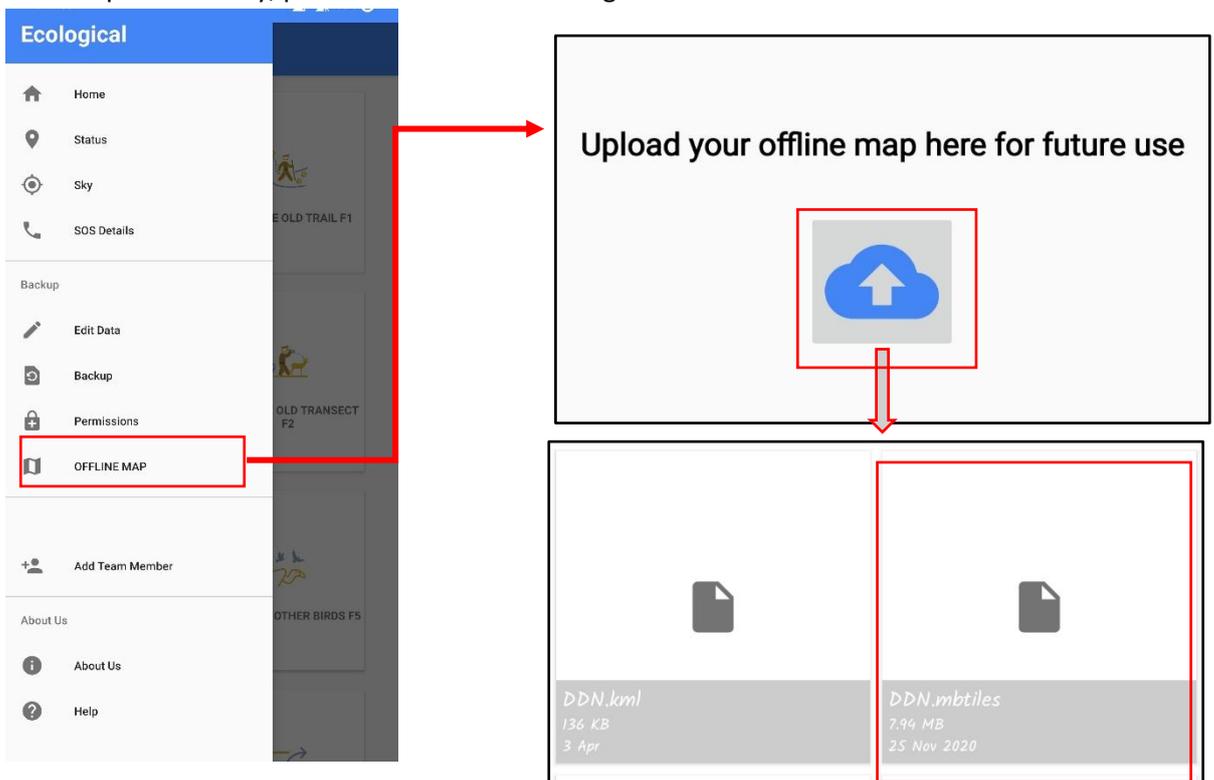
BACK

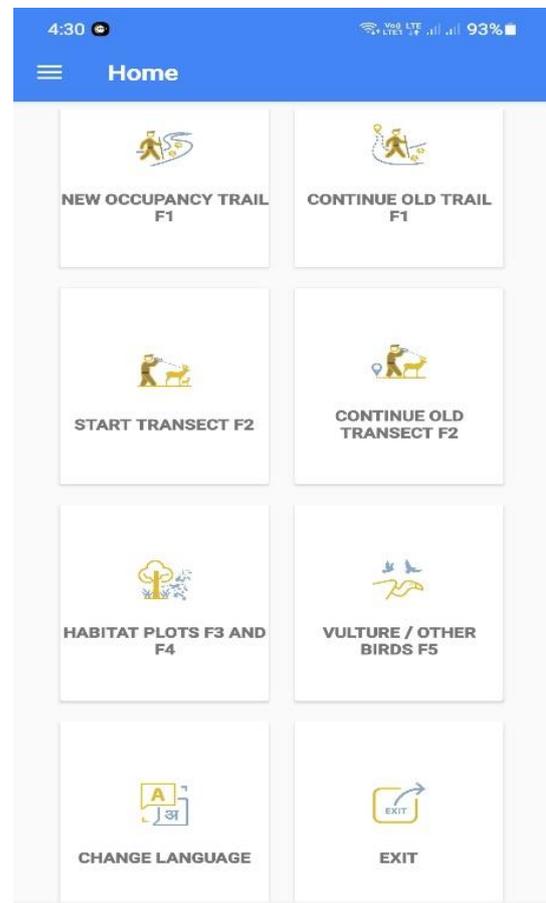
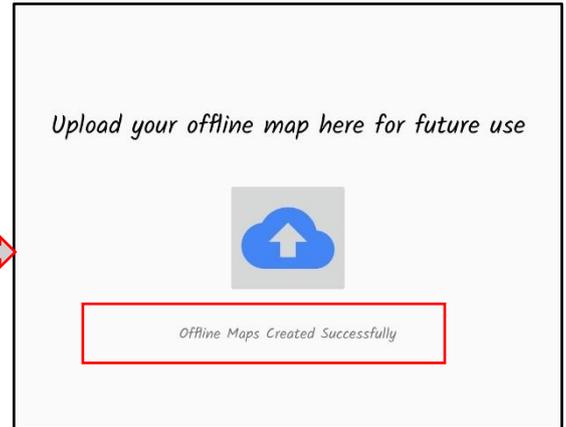
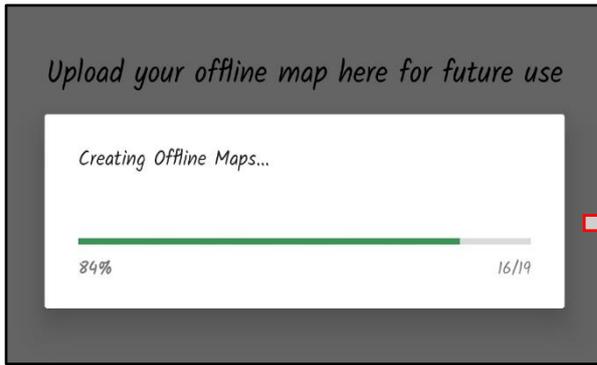
S.No	Name	Designation
6	ABC XYZ	Forest Guard
7	PQR	Forester

- To inform others during any emergency, add the contact in **SOS Details**. Here, add the number of your senior officer or your family members. This sends SMS alerts to your selected contacts with the GPS coordinates of your location.

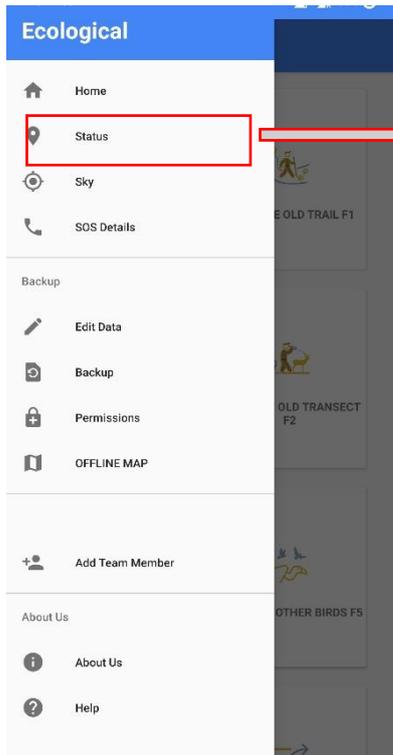


- Use the **OFFLINE MAP** in areas where there is no network connectivity. To load the offline map, click on the Offline Map and follow the steps. **Offline map (.mbtiles) should be kept in the internal memory of the phone.** Wait until the map is loaded successfully. After loading the map successfully, press the back button and go to the home screen.





- Before starting any form, click on the **STATUS** for GPS stabilization. For the accuracy of GPS, it is mandatory to have a minimum of five satellites in the fix (See # of Satellites).



The 'Status' screen displays the following information:

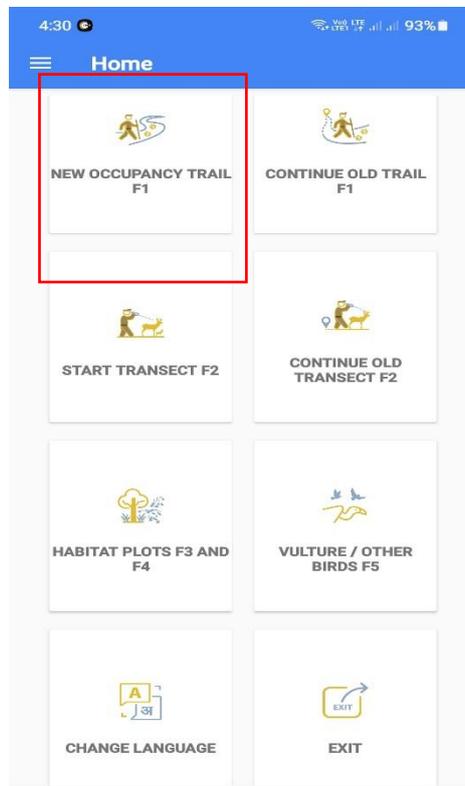
- Lat: 30.277903582647134
- Long: 77.98036766485521
- Alt: 559.36
- Alt (MSL):
- Speed: 0.0
- Time: 12/04/21 00:54 am
- TTF: 13391
- F H Acc: 4.90 m
- # Sats: 17/29
- Bearing: 0.0

Below this information is a table of satellite data:

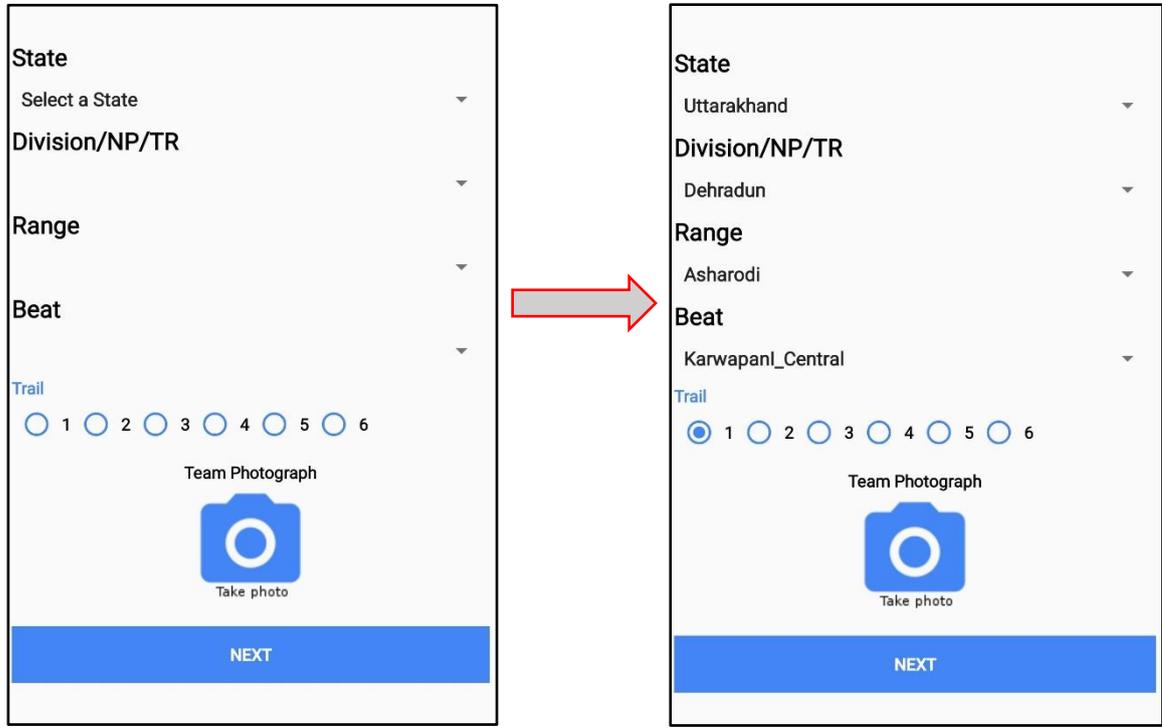
ID	GNSS	CF	C/N0	Flags	Elev	Azim
32	USA	1.57542003E9	39.0	AEU	68.16446	279.1853
10	USA	1.57542003E9	34.0	AEU	58.989227	14.457628
21	USA	1.57542003E9	19.0	AEU	7.5390415	320.81396
18	USA	1.57542003E9	21.0	AEU	32.510777	146.66026
27	USA	1.57542003E9	24.0	AEU	26.022074	256.60822
20	USA	1.57542003E9	20.0	AEU	20.528618	95.16912
31	USA	1.57542003E9	30.0	AEU	12.602495	189.5209
22	RUS	1.60031245E9	21.0	E	52.431009	208.72658
7	RUS	1.60481254E9	28.0	U	39.21034	22.412254
23	RUS	1.60368755E9	28.0	E	36.81887	316.99353
13	CHN	1.56109798E9	23.0	A U	54.295216	131.45367
8	USA	1.57542003E9	23.0	AEU	16.709505	292.94
23	USA	1.57542003E9	20.0	AEU	43.461575	68.97827
24	USA	1.57542003E9	20.0	AEU	19.143589	46.68937
10	RUS	1.59806246E9	21.0	A U	16.419819	136.15018
9	RUS	1.59862502E9	24.0	A U	24.471941	85.10602
1	RUS	1.60256256E9	24.0	U	13.994072	271.9327
21	RUS	1.60924998E9	20.0	AEU	11.4340725	174.72575
8	RUS	1.60537498E9	16.0	A U	43.77061	310.70612
16	RUS	1.60193744E9	0.0	AE	9.1298485	37.51626
11	USA	1.57542003E9	0.0	A	6.2430077	319.41135
6	CHN	1.56109798E9	0.0	E	56.283524	39.733105
5	CHN	1.56109798E9	0.0		52.163573	207.25206
8	CHN	1.56109798E9	0.0		29.034246	134.65755
9	CHN	1.56109798E9	0.0	E	83.86381	26.656393

## II. Detailed step for recording Sign Survey (Form-1) data using MStrIPES Ecological mobile application

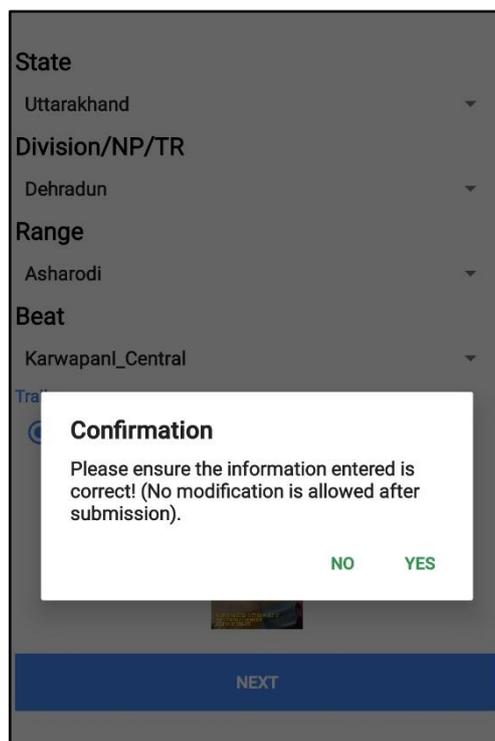
**Step 1:** Click on the **NEW OCCUPANCY TRAIL** icon to start the **sign survey** (Form-1).



**Step 2:** Select all the Administrative details and Trail number (sign survey route), make sure that you have **switched on the GPS**, click on the Team Photograph and take the photo of all the team members (Selfie), and click on **NEXT** to proceed to the next page. It is not possible to go to the next page without taking a team photo.



**Step 3:** If all the details are correctly filled then click **YES** on the confirmation message otherwise click **NO**, fill in the correct details and click on **NEXT**.



**Step 4:** After moving on the next page, select all the **Team Member** Name from the list who are going for the survey.

*Ecological Member Details*

*Member Name*

Select Member Name

PQR

ABC XYZ I

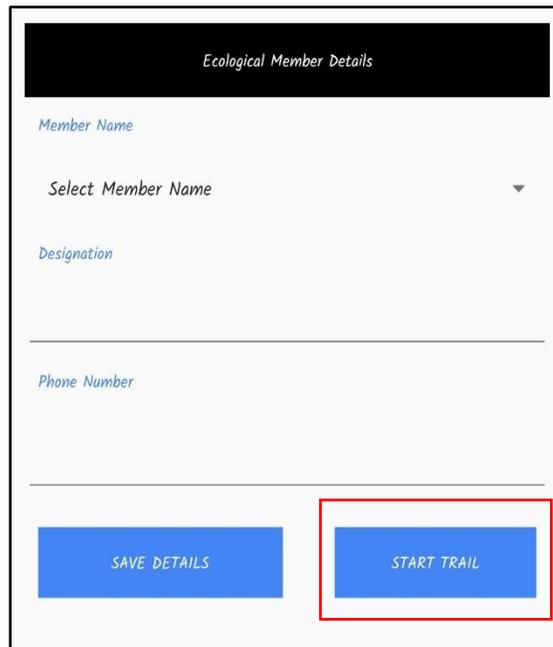
*Phone Number*

9876543210

SAVE DETAILS

START TRAIL

**Step 5:** After selecting all team members, click on the **START TRAIL**.

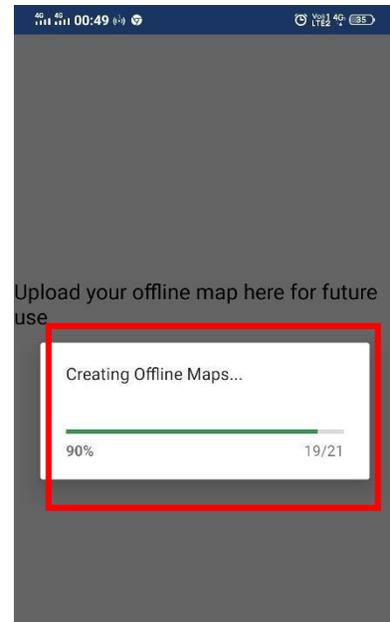
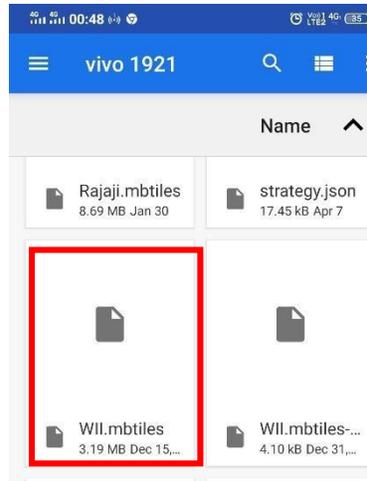
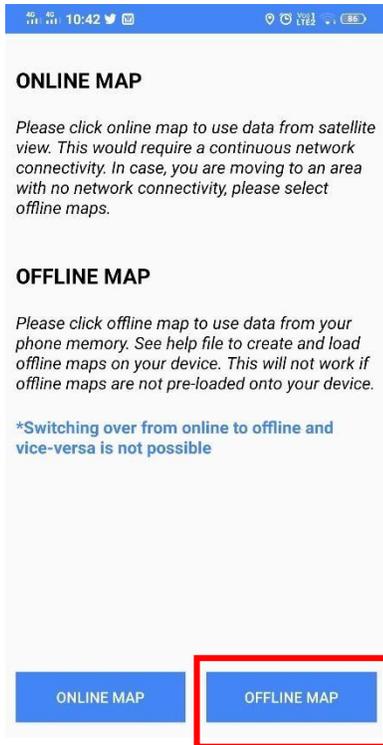


**Step 6:** After starting the trail, select the **ONLINE** or **OFFLINE** map. If you are surveying in the network connectivity area, then click on the **ONLINE MAP**, or else select the **OFFLINE MAP** if surveying in the area where there is no network connectivity.

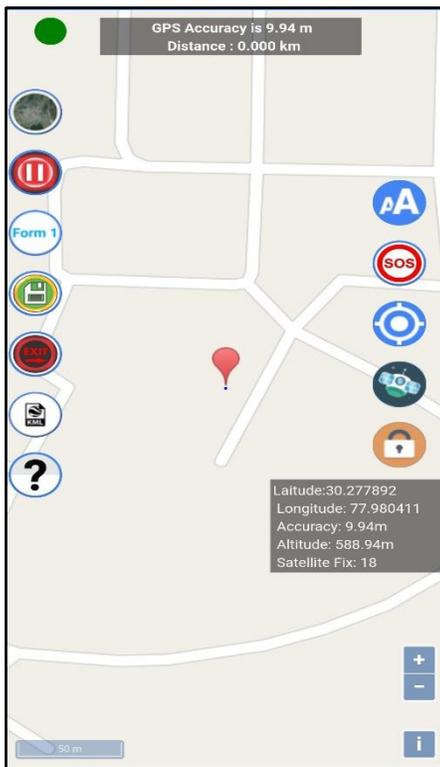
Note: You will have a map in the background using “online map” option **ONLY** if you have internet connection in your mobile. **BUT** you can still choose the “online map” option in case you do not have shapefiles (/Mbtiles) to load in the “offline map” option



Once the user clicks on offline map, it will browse to the internal memory where the MB tiles is stored. Here select the MB tiles of the area being surveyed. User has to import the MB tiles as shown in the image below. Once the MB tile is created user will get a geo referenced background map.



**Step 7:** The survey or walk can be started after coming to this map page (wait for the GPS to stabilize). The red balloon depicts your current location. As the survey progresses, the route map and distance of the survey can be seen on the top of this page.



**Step 8:** After getting the direct/indirect sign(s) of any **Carnivore Species** or **Mega Herbivore Species**, click on **Form-1** to record the observation.



**Step 9:** After clicking on Form-1, observation recording page will open. Record the **SIGN TYPE**, **SPECIES**, **AGE OF TRACK AND SIGN** data based on the sign observed, capture photograph of sign observed (not mandatory) then click **SAVE DETAILS**. In case of direct sighting of any species, you need to enter total number of individuals seen with details on male, female and young seen. Enter unknown for individuals you are not sure about their age and gender.

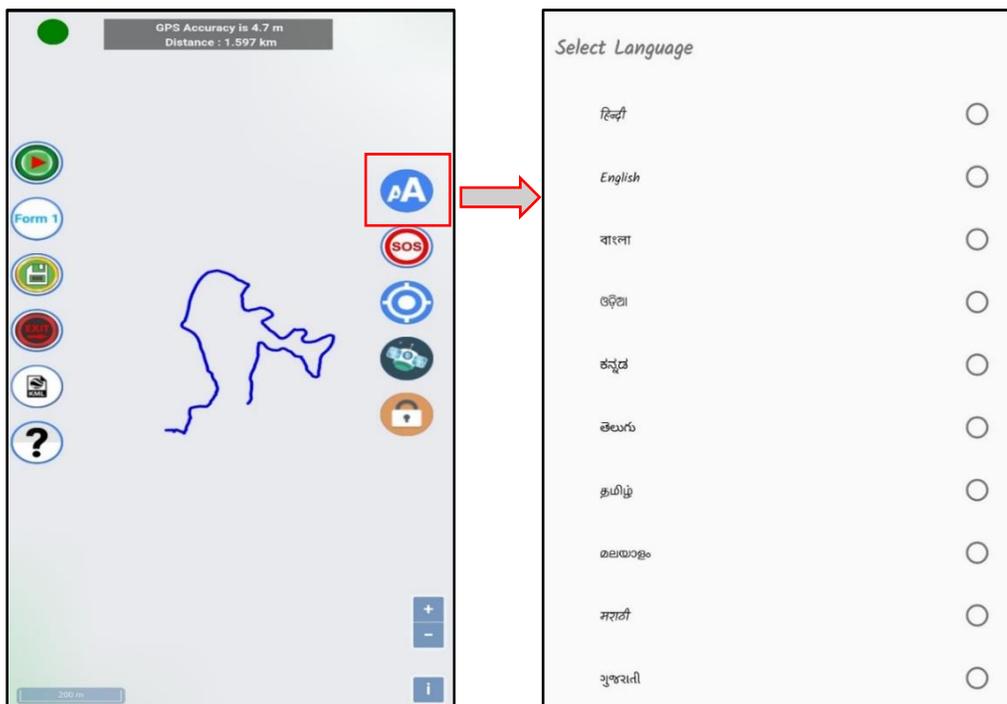
**Step 10:** After completing the trail survey, click on the **Questionnaire** form, fill in all the information then click **SAVE DETAILS**.

**Step 11:** Once the survey is completed, click on **SAVE** and **EXIT** the app.

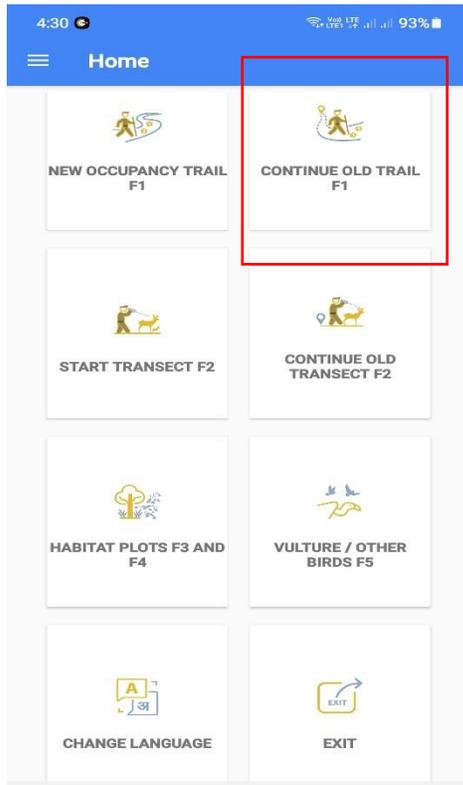


Though, the track and observations are automatically saved in the database, saving the data form will ensure further loss of any information. It is mandatory to Exit from the map screen after completion of the survey. Otherwise it will record unnecessary tracks and affect the survey effort made by the user.

**Step 12:** To change the language in the middle of the survey, click on the **CHANGE LANGUAGE** icon.

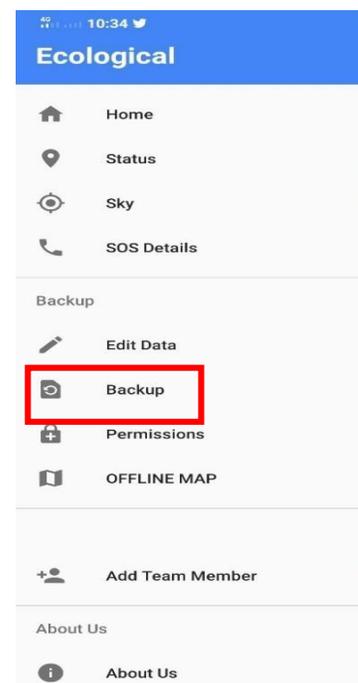
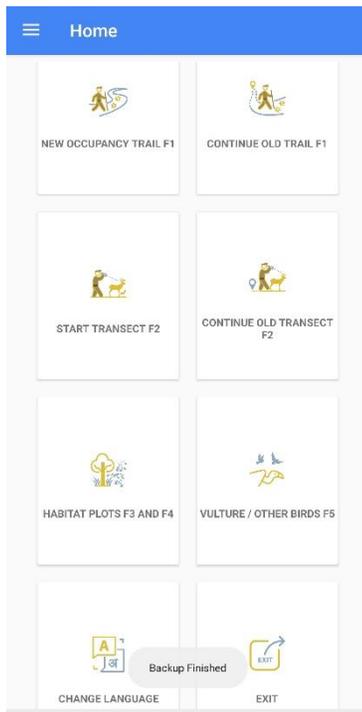


**Step 13:** During the survey, if the phone turns off or the app crashes due to any reason, click on the **Continue Old Trail** to re-start the survey from where the survey was closed.



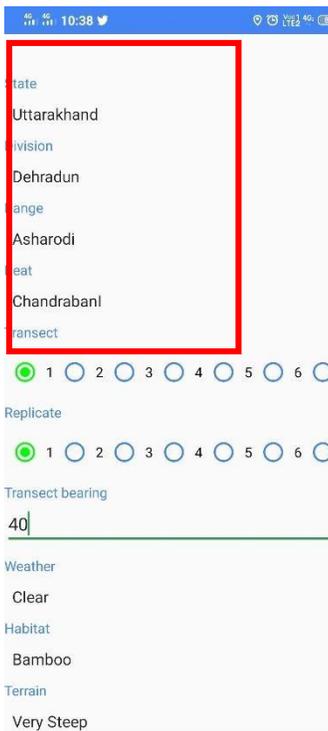
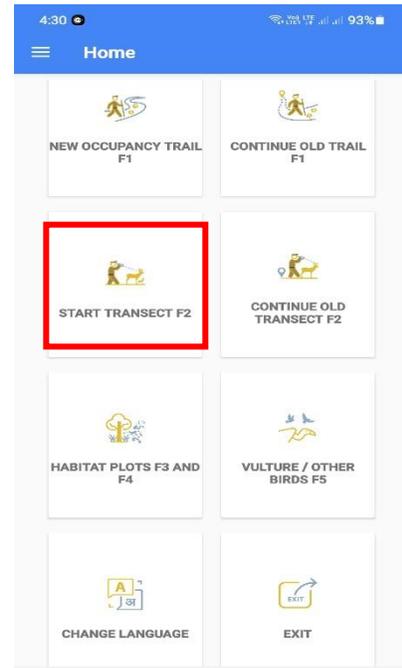
**Step 14:** Once all the necessary edits are finished, go to the dashboard and select **Backup** as shown in the image below. Once the backup is completed you will get a notification has Backup Finished.

Go back to your internal storage and you can find the folder **MSTRIPES\_ Ecological** where your backup will be stored.

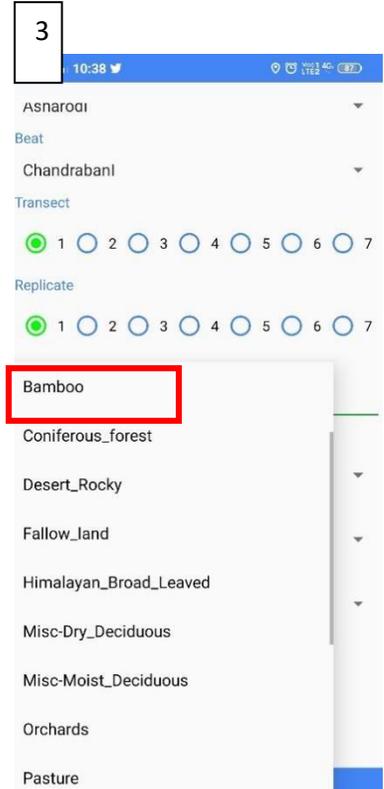
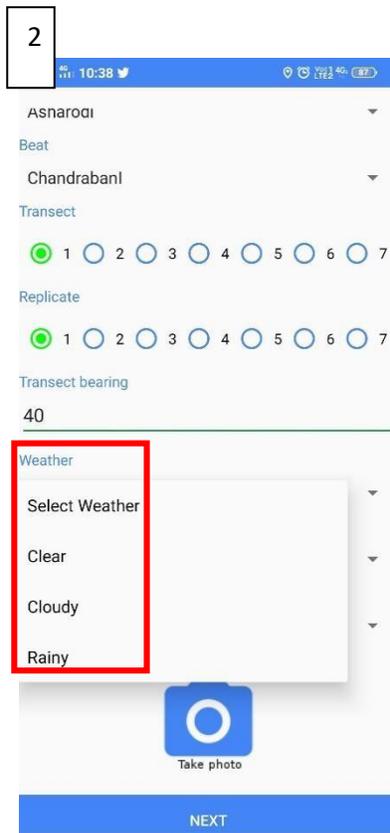
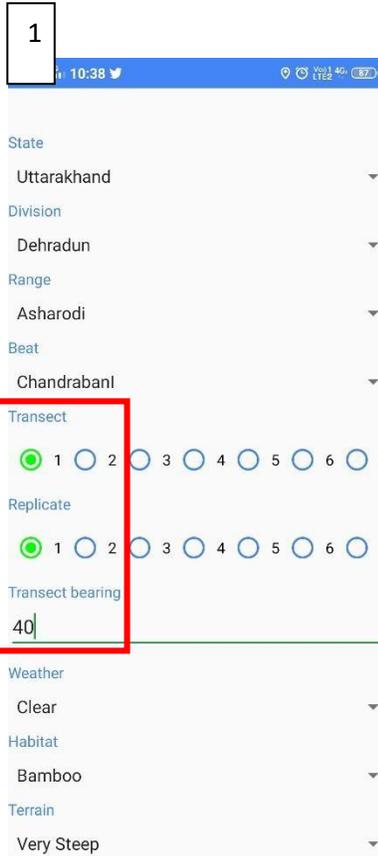


### III. Detailed step for recording Line Transect (Form-2) using MSTRIPES Ecological mobile application

**Step 1:** Once all the necessary details are filled (refer notes on **Steps for data collection using MSTRIPES ECOLOGICAL application**), start the data collection for line transect data by clicking on “Start Transect F2”. of form 2 (**line transect**) please click here

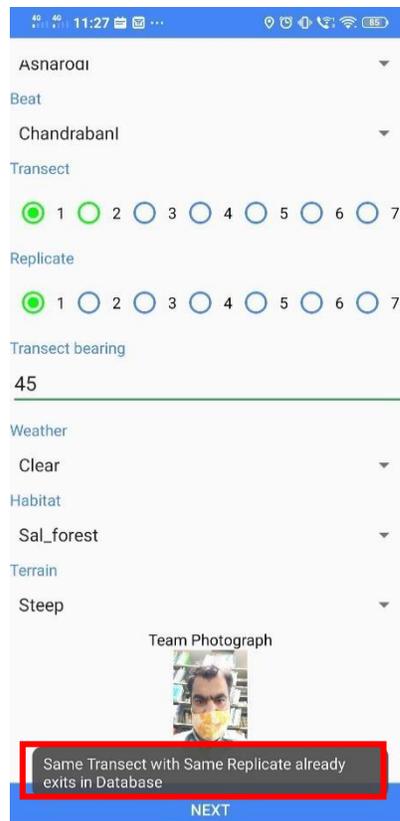
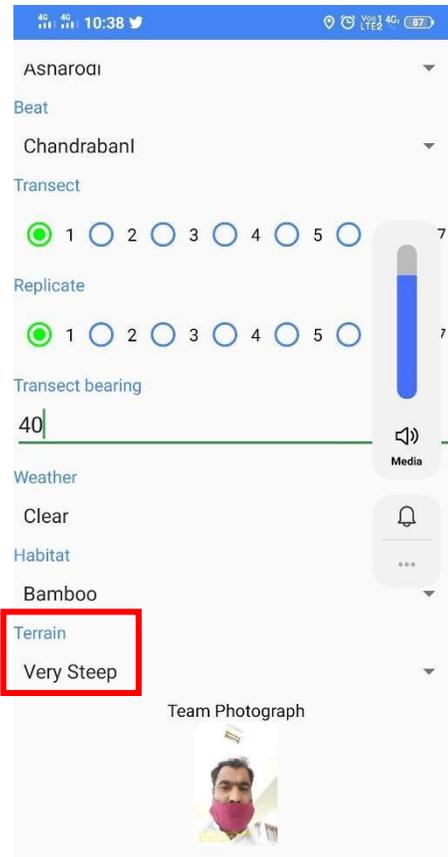


**Step 2:** Enter administrative details of your data collection area here by choosing the state, division, range and beat from the drop down list in the right side



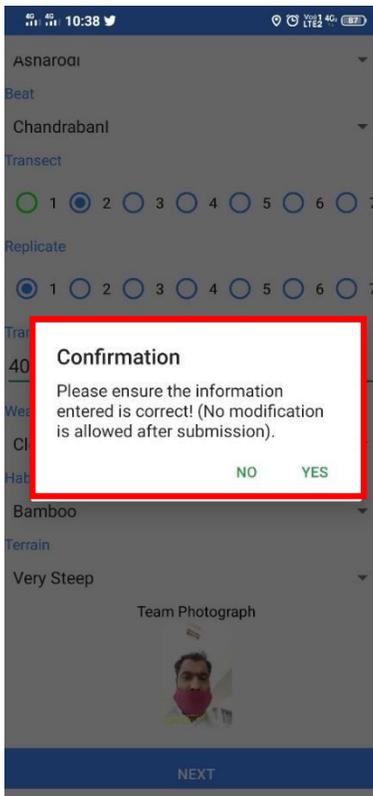
4

5

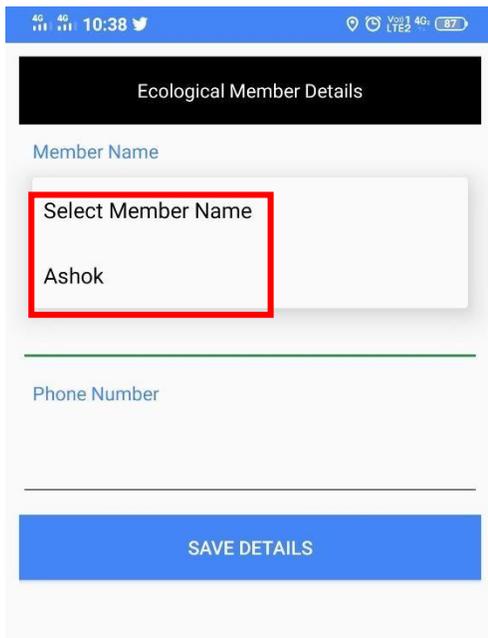


**Step 3: On this page enter all the transect details as follows**

1. Enter the transect ID and replicate ID and transect bearing. Measure the bearing using a compass.
2. Weather condition on that particular day.
3. Select the overall transect habitat from the drop down list.
4. Select the overall terrain type of the transect from the drop down list
5. **If the same transect id and replicate id exists in the user's phone then the app will show a notification saying the details are already existing as shown in the screen.**

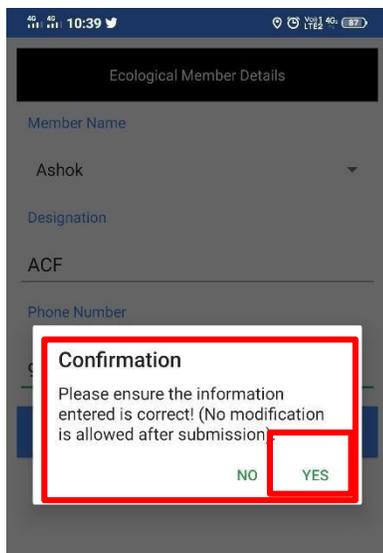


**Step 4:** Once all the required transect details are filled click next button. Confirm that all the details entered are correct or click “No” and edit the details.

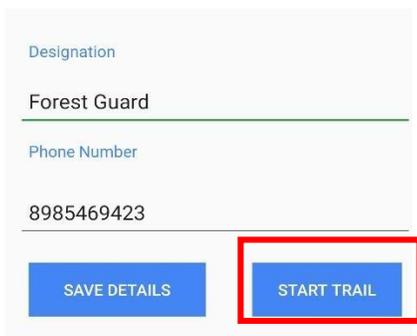


**Step 5:** Next select team member details from the drop down list. Here list of names that were saved during the steps in “**Steps for data collection using MSTripes ECOLOGICAL application**” will appear in the drop down. Once the team member name is selected, it will automatically fill the designation and phone number of the concerned staff. (**\*Only the team member details already added earlier will be visible in the dropdown list if the user wants to add any new member then do that from “add team member details” from the dashboard**).

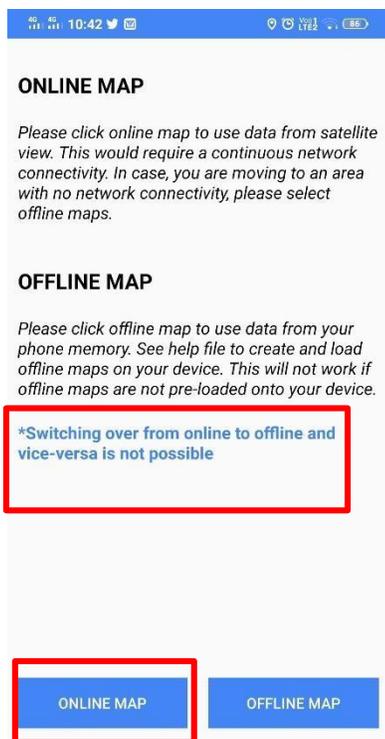
Click “save details” after filling the details.



**Step 6:** Here again, confirm that all the details entered are correct or not, if details are to be edited then click on “no” otherwise “yes”.



**Step 7:** After saving all the details, the user can now select “start trail” to begin the transect walk (\* **Form 2- Transect**).

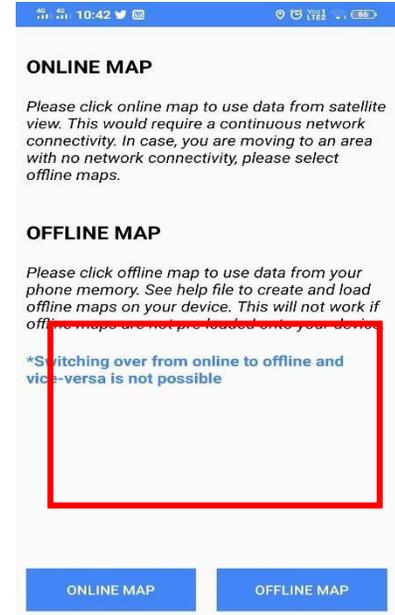
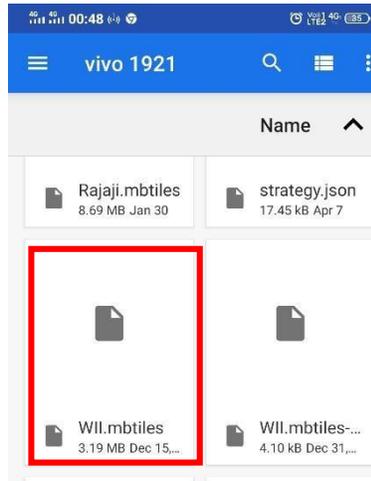
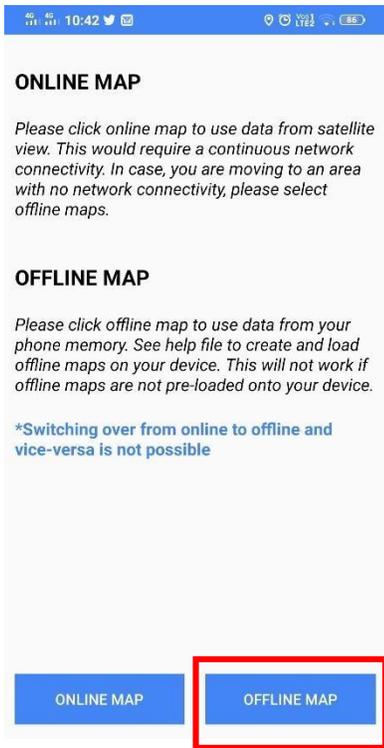


**Step 8:** Once you click start trail it will take you to the page where you have to select online/offline map.

You will have a map in the background using “online map” option **ONLY if you have internet connection in your mobile. BUT you can still choose the “online map” option in case you do not have shapefiles (/Mbtiles) to load in the “offline map” option**

Switching from online to offline and vice versa is not possible

If the user clicks on offline map, app will browse to the internal memory where the MB tiles is stored. Here select the MB tiles of the area being surveyed. User has to import the MB tiles as shown in the image below. Once the MB tile is created user will get a geo referenced background map.



**Step 9:** After selecting the map option, this page will appear with current location (lat/lon) displayed. Make sure you have **switched on the GPS**,



**Step 10:** When any species of interest is sighted during the walk click the **form 2** tab, where details of the sighting are to be entered.

1

Ecological Form 2

Species

Select Species

Total Animals

Young Seen

Habitat

Select Habitat Type

Terrain

Select Terrain Type

Animal Bearing

Walk Bearing

40

Angular Distance(mtr)

Remarks

Enter Any Remarks Here

2

Select Species

Assamese Macaque

Barking Deer

Blue Sheep Bharal

Buffalo

Cattle

Chital or Spotted Deer

Donkey

Elephant

Flying Squirrel

Goat

Goral

Hanuman langur

Hare

3

Ecological Form 2

Species

Elephant

Total Animals

2

Young Seen

2

Habitat

Select Habitat Type

Terrain

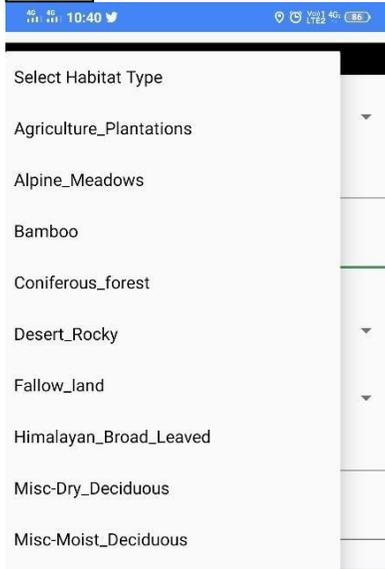
Select Terrain Type

Animal Bearing

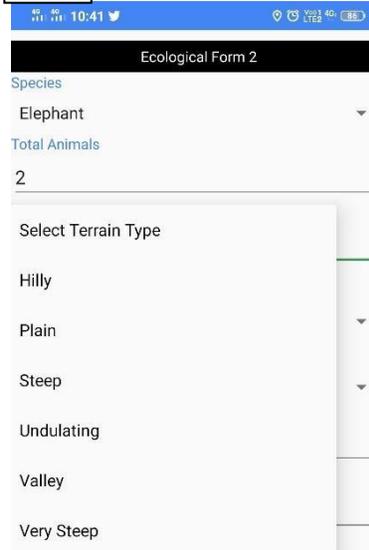
**Step 11: On this page enter all the details related to the species sighting as follows:**

1. & 2. Once form 2 tab is selected, user will enter a page where they can select species sighted form the drop down list
3. After selecting species from the list enter the details of number of animals seen including the young ones if seen (**\*Make sure the values entered in young ones should not be more than the total animals seen**).

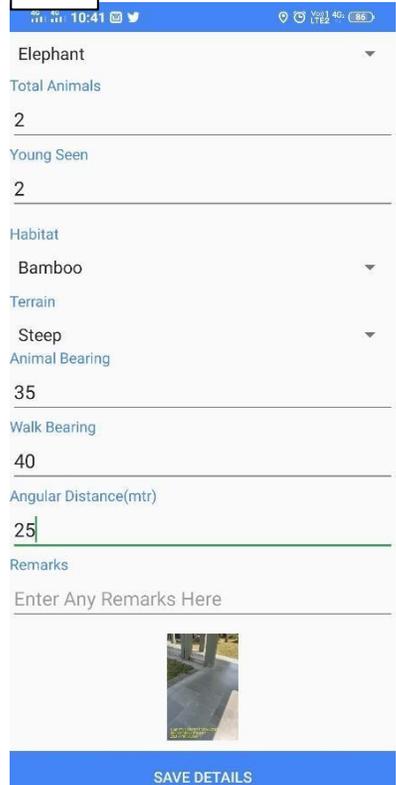
4



5



6



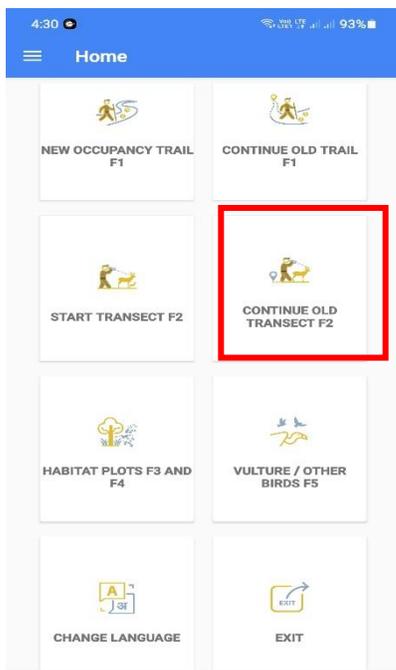
4. Select the habitat type and the terrain type from the drop down list where the animal is encountered.
5. Enter the animal bearing using the compass that you are carrying.
6. Form will automatically fill in the **walk bearing using the transect bearing entered in step 3, but you need to ensure that your walk bearing is same as your transect bearing, During transect walk sometime minor deviation happens due to terrain and obstruction on the way of transect line. Hence it is strongly advised to record and enter walk bearing. Please ensure that the deviation should be minimal.** Measure the radial distance using the range finder and record in the application. Take photo of the animal encountered if possible and click “save details”.

**Step 12:** Once the survey is completed, click on **SAVE** and **EXIT** the app.

**SAVE** ←  
**EXIT** ←



**Step 13:** In case the same transect needs to be continued later on, then click the tab “continue old transect F2”. As shown in the image the old trail will appear in Red and the continued trail will appear in Blue color

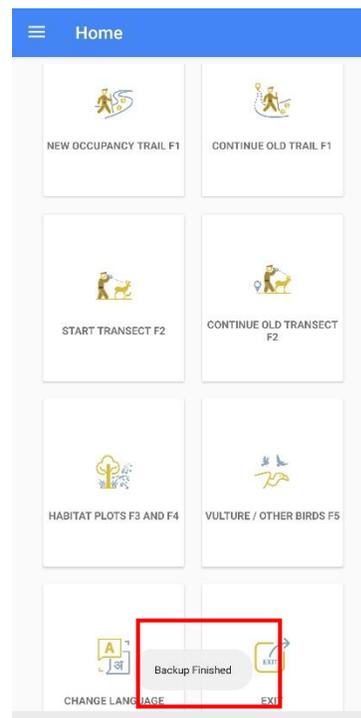
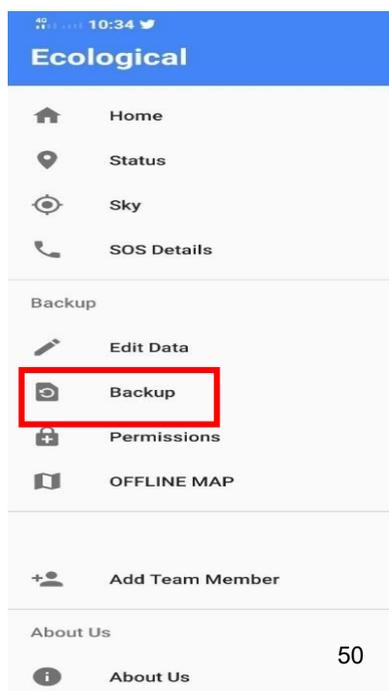


**Step 14:** To change the language in the middle of the survey, click on the **CHANGE LANGUAGE** icon.



**Step 15:** Once all the necessary edits are finished, go to the dashboard and select **Backup** as shown in the image below. Once the backup is completed you will get a notification has Backup Finished.

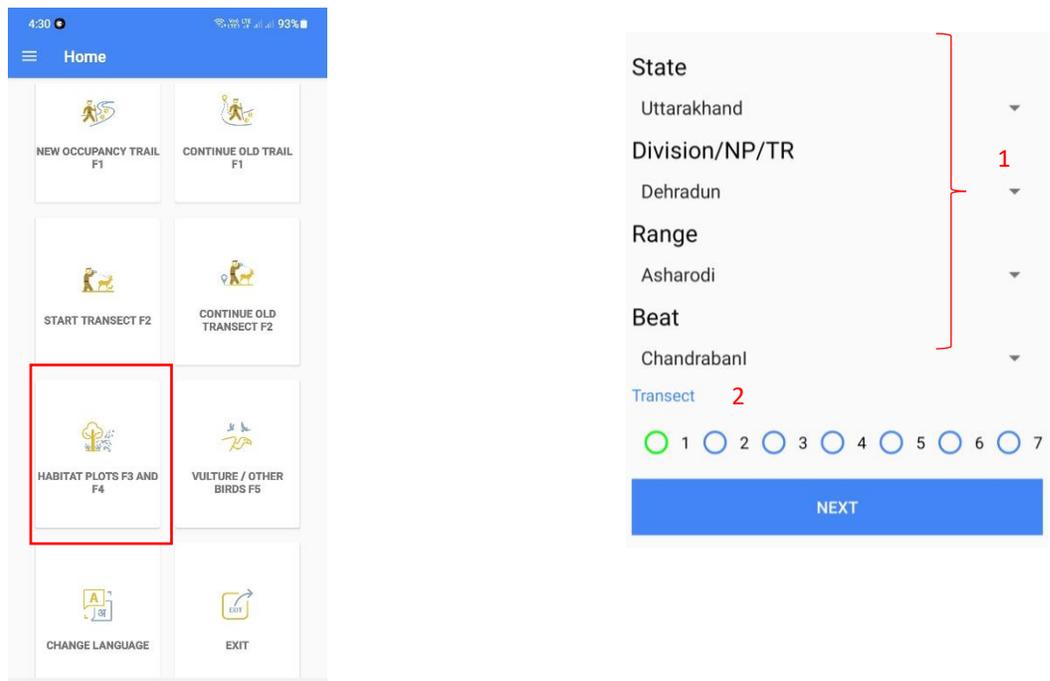
Go back to your internal storage and you can find the folder **MSTRIPES\_ Ecological** where your backup will be stored.



#### IV. Detailed step for recording Habitat Plots (Form-3 A,B,C) and Pellet (Form 4) data using MSTRIPES Ecological mobile application

**Step 1:** Select the “Habitat plot” icon on the home screen to enter vegetation data of the line transect. Enter the details as follows:

1. Fill the information on state, division, range and beat using the drop-down option
2. Select the transect on which the plot is to be sampled. All existing transects are highlighted in green



**Step 2:** Click on the plot number to be sampled. Usually plot zero is at the start/end of the transect, and the subsequent plots are at every 400 meters



**Step 3:** On clicking a plot-number, a sequence of forms is open. Click the first option and ‘Record plot GPS’ to enter the location and date-time details in the form



**Step 4:** Click on ‘Form – 3A’ to start entering the habitat information

**Note-** On recording the GPS, the option is turned green, and the plot number turns orange, depicting the half-completed form

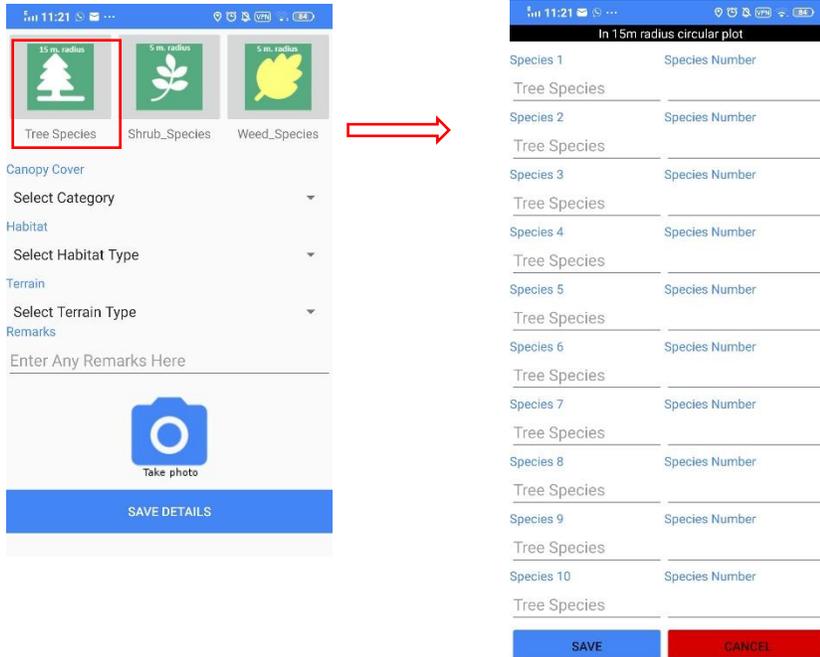


**Step 5:** On clicking form 3A the following screen will open, here enter the information of canopy density, habitat types and terrain type describing the 15 m radius plot, using the drop-down menu. Take a photograph of the plot habitat. This photo is geo-tagged.

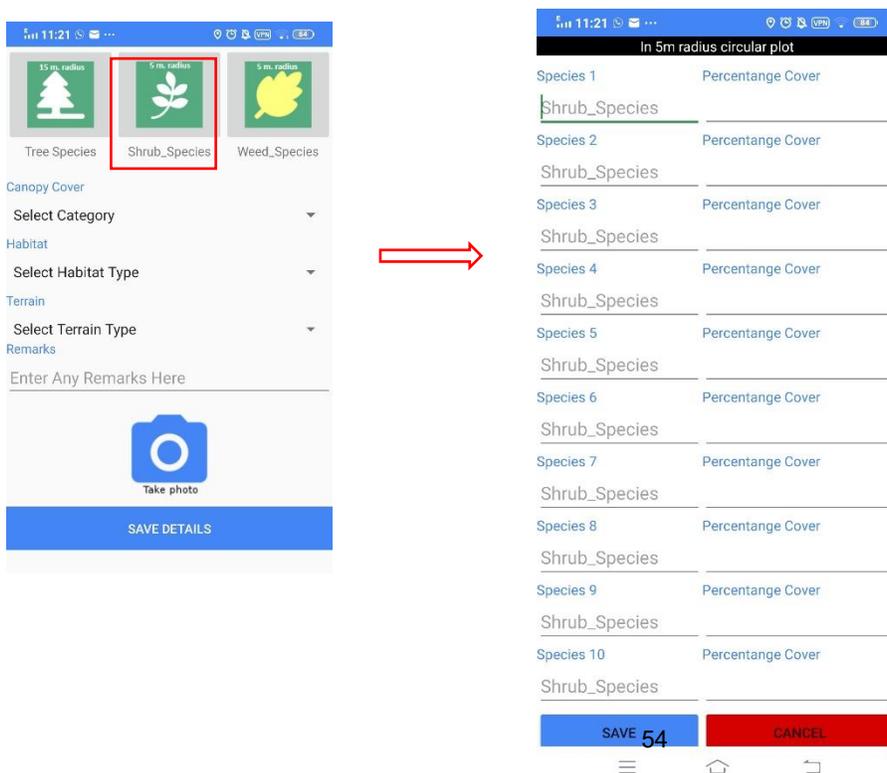
The screenshot shows a mobile application interface with the following elements:

- Top status bar: 11:21, signal strength, VPN, and battery (84%).
- Species selection: Three buttons labeled '15 m. radius', '5 m. radius', and '5 m. radius' with icons of a tree, a shrub, and a weed respectively. Below them are labels 'Tree Species', 'Shrub\_Species', and 'Weed\_Species'.
- Canopy Cover: A dropdown menu with 'Select Category' and a downward arrow.
- Habitat: A dropdown menu with 'Select Habitat Type' and a downward arrow.
- Terrain: A dropdown menu with 'Select Terrain Type' and a downward arrow.
- Remarks: A text input field with the placeholder 'Enter Any Remarks Here'.
- Take photo: A blue camera icon with the text 'Take photo' below it.
- SAVE DETAILS: A blue button with white text.

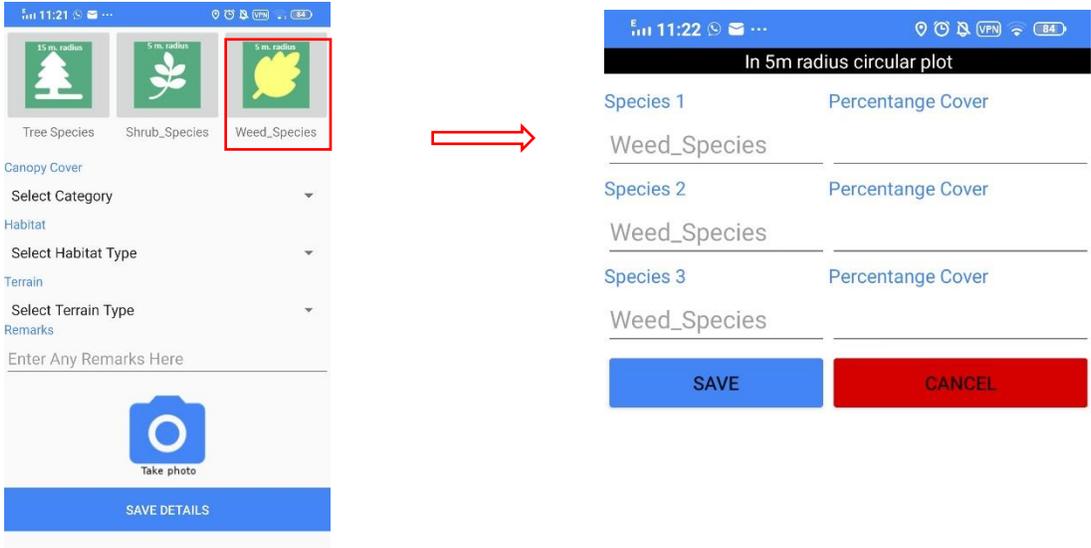
**Step 6:** Select the “Tree species” option to enter the names and number of trees in a plot of 15 m radius. In this form enter tree species names from the drop-down menu. Scientific and local names are available here. Enter the number of trees for every species entered



**Step 7:** Select the “Shrub species” option to enter the names and percent cover of shrubs in a plot of 5 m radius. In this form enter shrub species names from the drop-down menu for and percent cover of every recorded shrub species in a plot. The total of all percentage cover should be equal to or less than 100%.



**Step 8:** Select the “Weed species” option to enter the names and percent cover of invasive species and weeds in a plot of 5 m radius. In this form enter Weed species name from the drop-down menu and percent cover of every recorded invasive weed species in a plot. The total of all Percentage cover should be equal to or less than 100%.



**Step 9:** Click on save after filling in all the information and exit the form.

**Step 10:** On recording and saving all entered information in FORM-3A, the option is turned green. Now click on ‘Form – 3B’ to start entering the information on Human disturbance. Here, enter the following information:

- 1) total number of trees felled in the 15 m radius plot.
- 2) total number of branches lopped in the 15 m radius plot.
- 3) total number of human or livestock trails in the 15 m radius plot.
- 4) total number of people other than the sampling team, sighted from the plot
- 5) total number of livestock sighted from the plot
- 6) Click either yes or no for the presence of grass/bamboo cutting

Take a photograph of the plot to depict human disturbances in the plot and click ‘save, to exit, after filling all information



**Step 11:** On saving the human disturbance form on any plot of a transect, a questionnaire survey appears once. Here a summary of human presence within the beat must be entered. Do it for any one plot on a transect. Click yes or no for the presence of human settlement in the beat, if yes is selected follow-up questions shall appear. Click yes or no for the presence of NTFP collection in the beat, if yes is selected follow-up questions shall appear. Enter the extent of fire/brining in the beat in past 12 months, where 0 = no fire, 4 = >50% beat burnt.

Click 'save, to exit, after filling all information

1) Are there any permanent human settlements in the beat?  
 Yes  No

How Many  Human Population   
 Livestock Population  
 Cattle  Goat\_Sheep  Other Livestock

2) Is there any NTFP Collection in the beat?  
 Yes  No

What NTFP is Collected. NTFP1  NTFP2  NTFP3  NT

3) Fire Extent in the beat in past 12 months(0-4)

SAVE DETAILS

**Step 12:** On recording and saving all entered information in FORM-3B, the option is turned green. Now click on 'Form – 3C' to start entering the information on ground cover.

In a 1 m radius plot, enter the percent cover of dry leaf litter. Remove the leaf litter after this. In the remaining plot, enter the relative percent cover of dry grass, green grass, herbs, weeds, and bare ground, such that the total of these should be 100%

Latitude 30.283620 Accuracy 6.20 m  
 Longitude 77.972851 Satellite Fix 14/27

PLOT-00 PLOT-01 PLOT-02 PLOT-03  
 PLOT-04 PLOT-05 PLOT-06 PLOT-07  
 PLOT-08 PLOT-09 PLOT-10 PLOT-11

Select Form to Fill

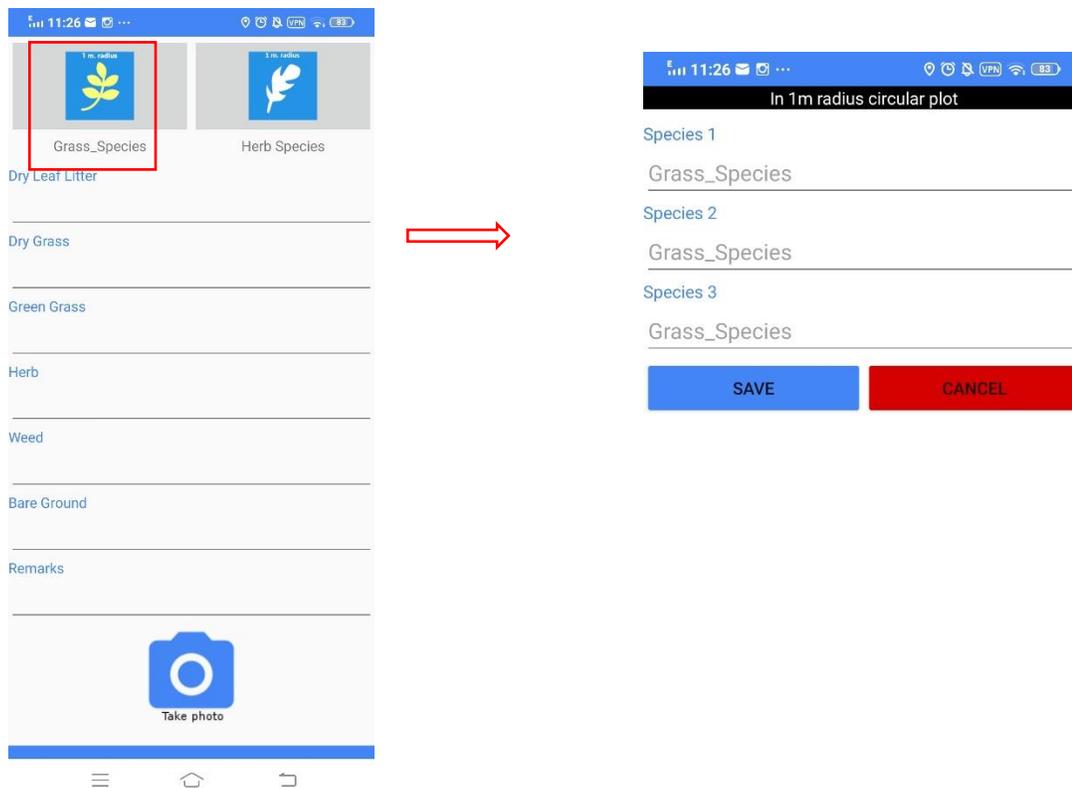
RECORD PLOT GPS  
 FORM - 3A  
 FORM - 3B  
 FORM - 3C  
 FORM - 4



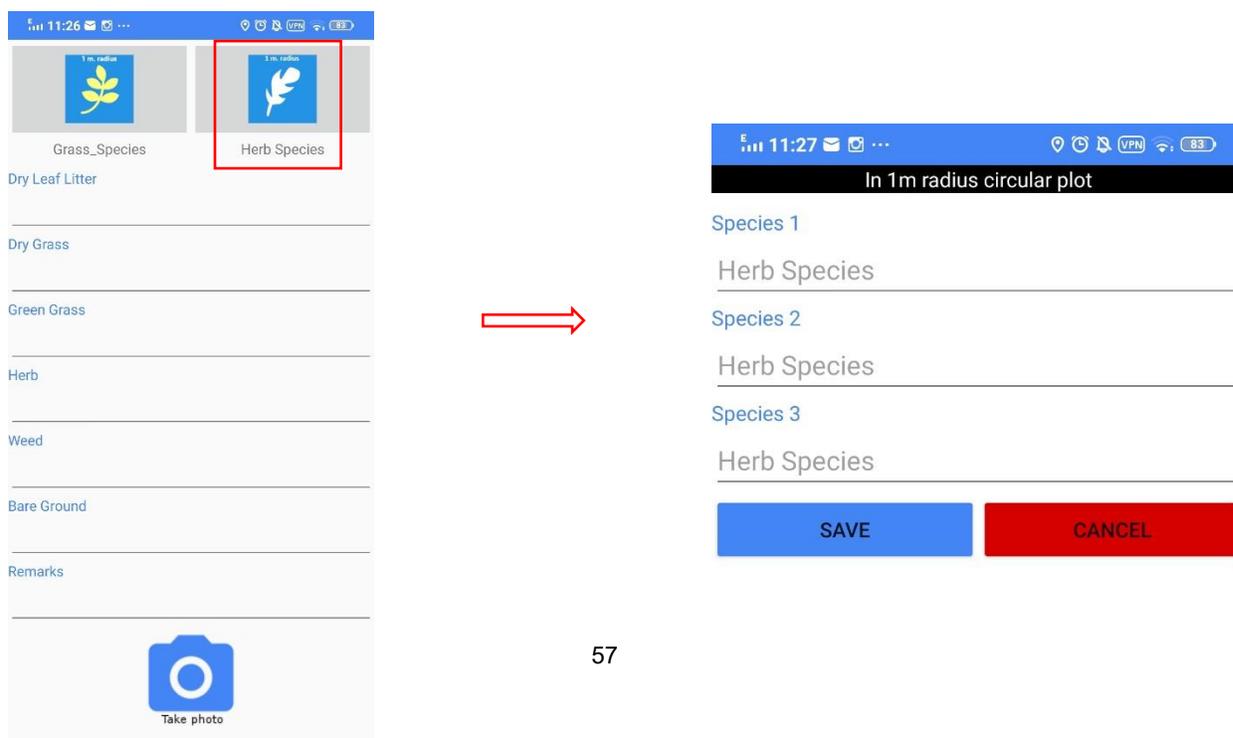
1 m. radius 1 m. radius  
 Grass\_Species Herb Species

Dry Leaf Litter  
 Dry Grass  
 Green Grass  
 Herb  
 Weed  
 Bare Ground  
 Remarks

**Step 13:** Select “Grass\_Species” to enter data on three dominant grass species in the 1 m radius plot. Enter the species names in rank of their cover, such that the species with highest ground cover is entered first. Click ‘save’ to exit, after filling all information



**Step 14:** Select “Herb Species” to enter data on three dominant herb species in the 1 m radius plot. Enter the species names in rank of their cover, such that the species with highest ground cover is entered first. Click ‘save’ to exit, after filling all information



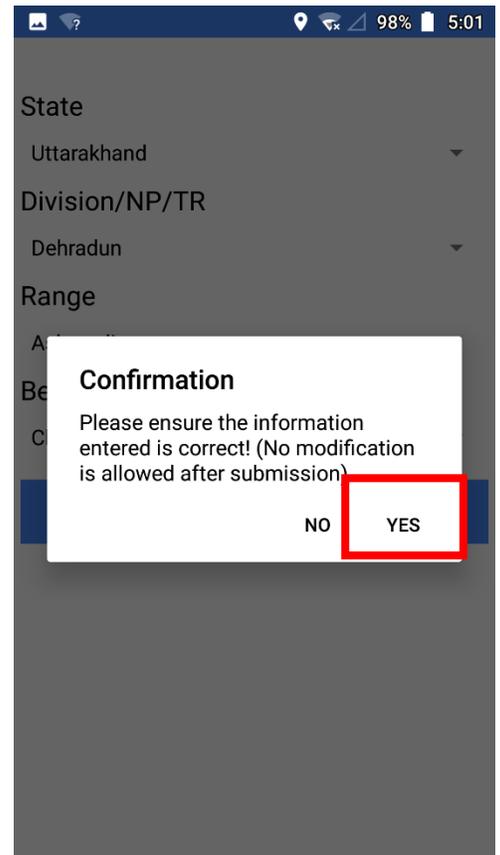
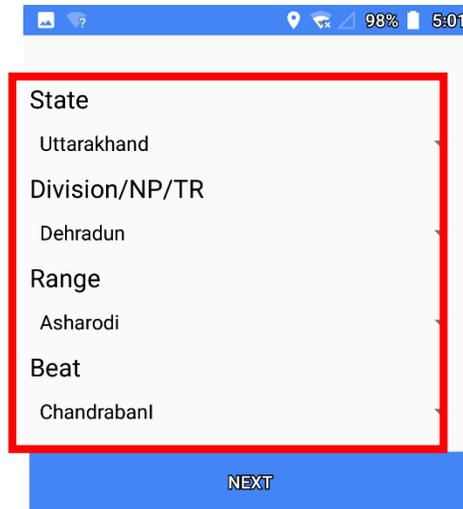
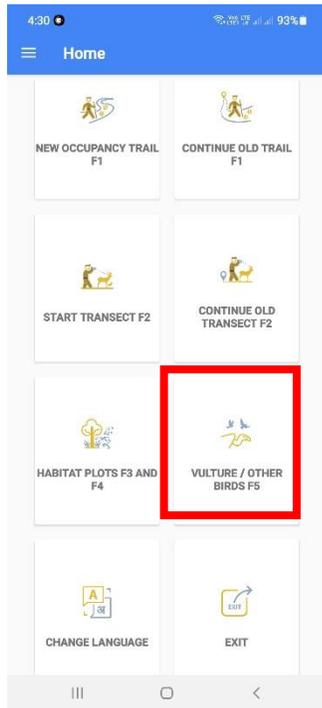


**NOTE:** Once all the forms recording the habitat data of a plot are filled, the Plot number colour will change to green indicating that the user has filled all the forms details (3a, 3b, 3c and 4).

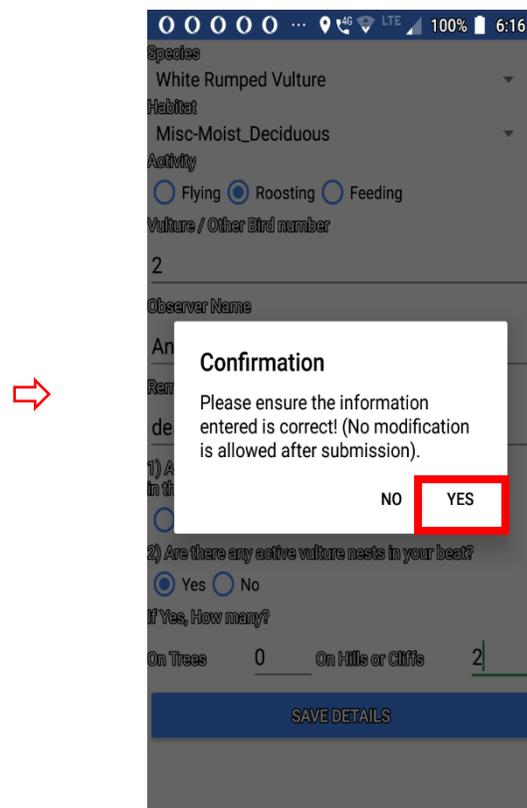
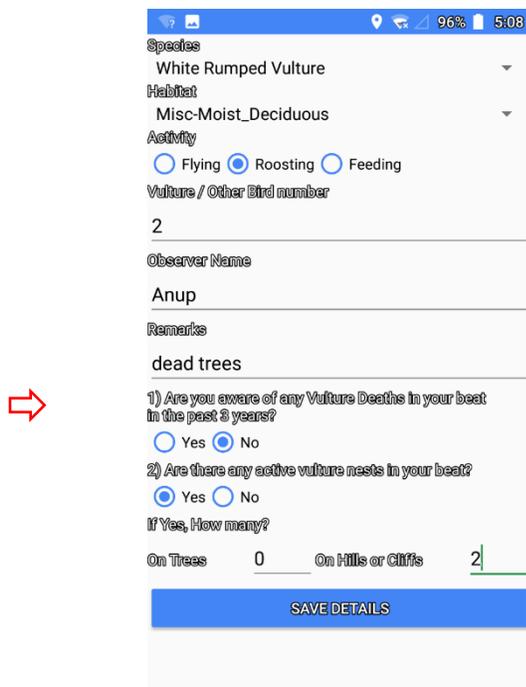
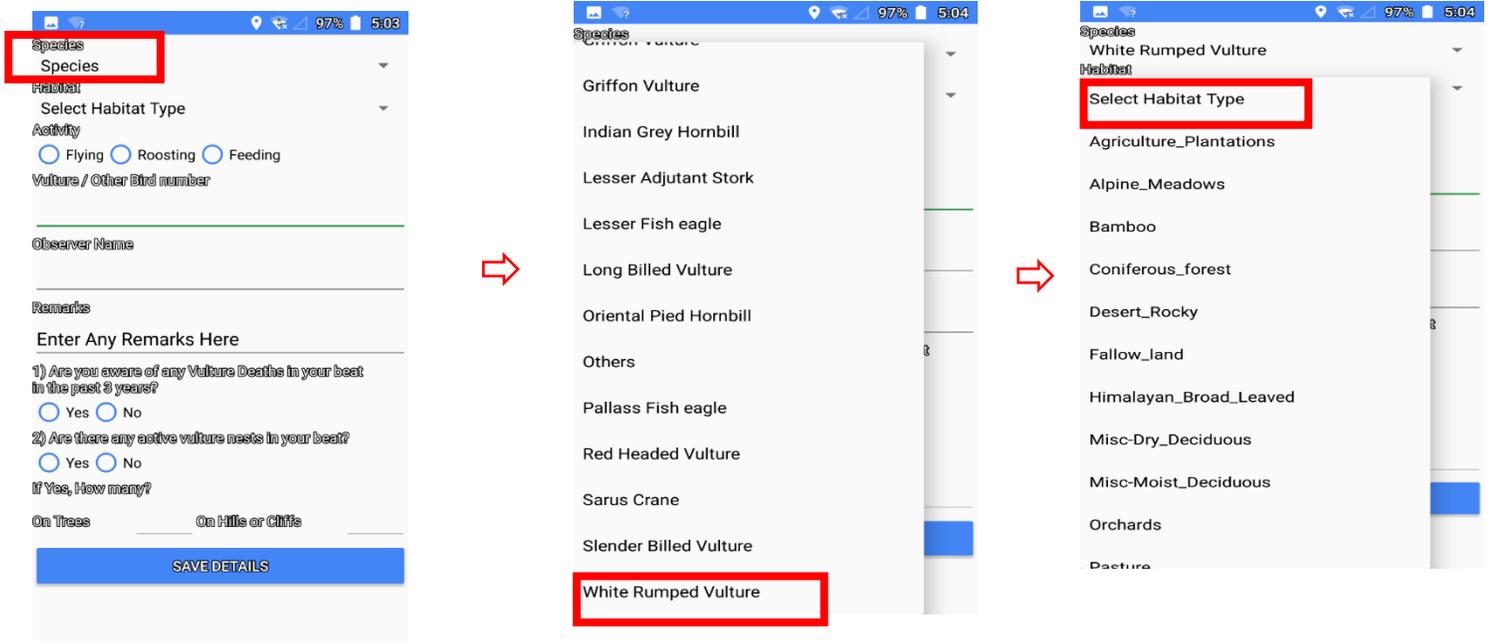
Latitude	30.277886	Accuracy	10.51 m
Longitude	77.980409	Satellite Fix	15/22
<b>PLOT-00</b>	PLOT-01	PLOT-02	PLOT-03
PLOT-04	PLOT-05	PLOT-06	PLOT-07
PLOT-08	PLOT-09	PLOT-10	PLOT-11
PLOT-12	PLOT-13	PLOT-14	PLOT-15
PLOT-16	PLOT-17	PLOT-18	PLOT-19

## V. Detailed step for recording Vulture data (Form-5) using MStrIPES Ecological mobile application

**Step 1:** Click on Vulture/Other Birds F5 form and then fill the administrative boundary details and confirm the details by selecting “yes” and if the details are to be edited then select “no” and edit the details.



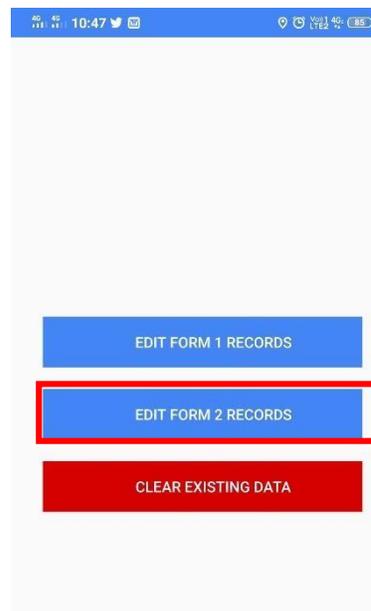
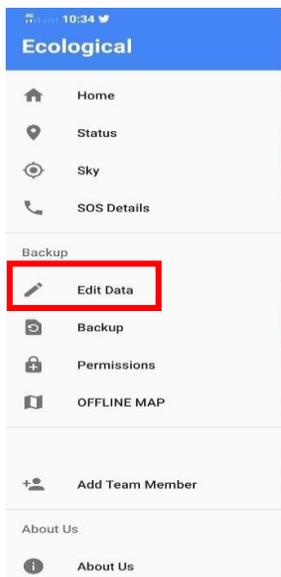
**Step 2:** After entering the details the form to enter vulture/other birds details opens. Here enter the information on species name from the drop down list. Select the habitat type in which the bird was sighted. Fill in the other details given in the form, confirm the data entered (by selecting “yes”) and save details.



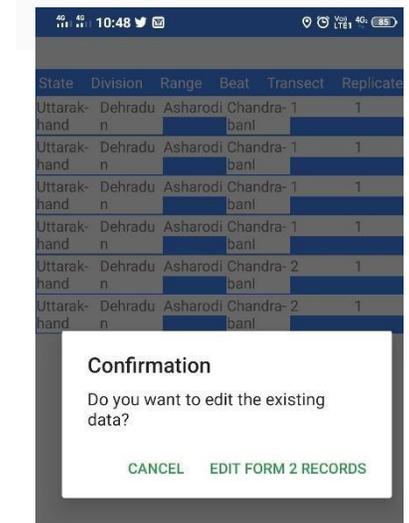
## VI. Detailed step for editing records using MSTRIPES Ecological mobile application

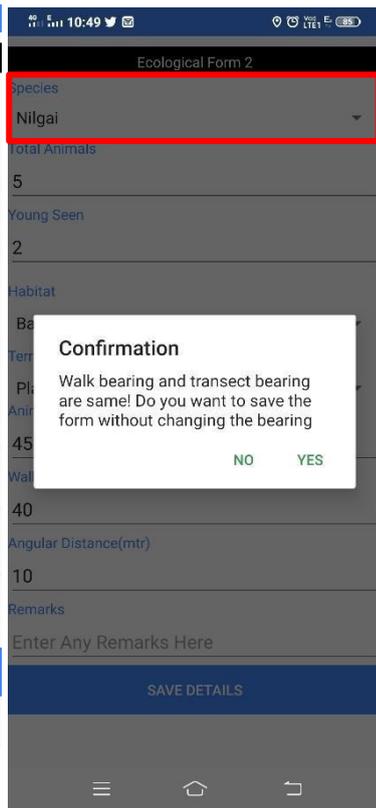
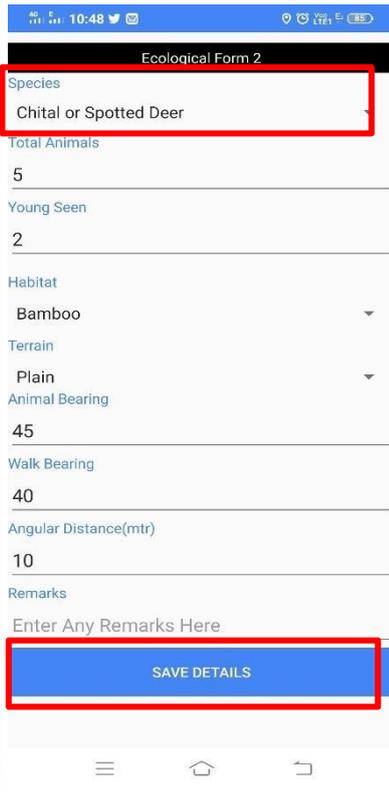
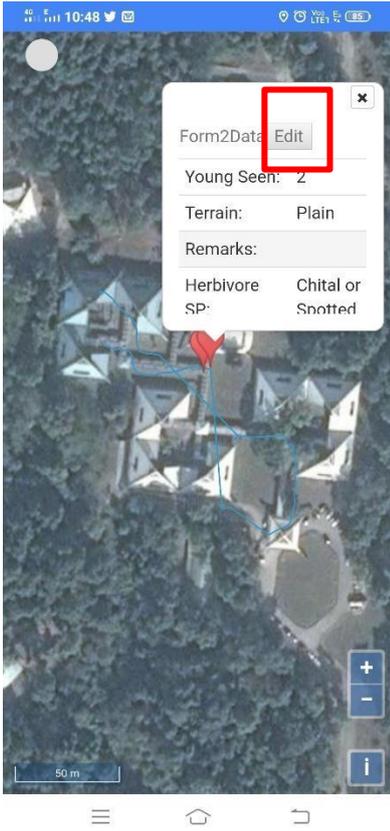
Step 1: Once the user has recorded all the information and saved details, there is an option to edit saved observations if wrong details have been entered. For this following steps are to be carried out:

1. Go to the dashboard and select **edit data** as shown in the image.
2. Once you click edit data It will ask you which form you would like to edit. In this example the user has selected Form 2 to be edited.
3. Once the form is selected a data table, containing information recorded in that form, will appear . For eg: here details of the transect like administrative details with the transect id and replicates are seen.
4. Click on the information that you wish to edit. Once the user does this, the app asks to confirm that you want to edit the existing data.
5. Once you click yes, “edit form 2 records” tab appears on the screen. Here the user can also see the trail walked with animals encountered in form of red balloon icons.
6. On clicking the red balloon icon, screen to edit the data opens. In this example species name is changed from Chital to Nilgai. After editing the record, click save details.
7. Once the user selects “save details” the app shows a confirmation notification, asking the user to confirm if the walk bearing and animal bearing are same or not. If this information has not changed then click “yes” otherwise click “no” and change the bearing.



State	Division	Range	Beat	Transect	Replicate
Uttarakhand	Dehradun	Asharodi	Chandra-1	banl	1
Uttarakhand	Dehradun	Asharodi	Chandra-1	banl	1
Uttarakhand	Dehradun	Asharodi	Chandra-1	banl	1
Uttarakhand	Dehradun	Asharodi	Chandra-2	banl	1
Uttarakhand	Dehradun	Asharodi	Chandra-2	banl	1





**SOME  
COMMON  
SPECIES**

**कुछ  
वन्य-जीव**

**APPENDIX-I  
परिशिष्ट-1**



☞ Dhole/Wild dog डोल/जंगली कुत्ता



☞ Jackal गीदड़



☞ Wolf भेड़िया



☞ Indian Fox लोमड़ी



☞ Hyena जरक



☞ Jungle Cat जंगली बिल्ली



Chital चीतल



Sambar सांभर



Nilgai नीलगाय



Gaur गौर



Chinkara चिंकारा



Chowsingha चौसिंघा



⌚ Hog Deer पादा



⌚ Mouse Deer मुसा हिरन



⌚ Barasingha नारासिंघा



⌚ Wild Pigs जंगली सुअर



⌚ Blackbuck काला मृग



⌚ Barking Deer काकड़ (भेडकी)

TRACKS OF  
MAJOR  
CARNIVORES

मुख्य मांसभक्षी  
जानवरों के  
पदचिन्ह

APPENDIX-II  
परिशिष्ट-2

⊕ 6 inch



Tiger बाघ



Leopard तेंदुआ

⊕ 3.5 inch



Hyaena लकड़बग्घा



Dhole सोनकुत्ता



Jackal गीदड़

⊕ 7 inch



Sloth Bear भालू

## **FECAL PELLETS OF WILD UNGULATES AND THEIR CHARACTERISTICS**

### **SAMBAR**

Though sambar occur in most forested areas, their preferred habitat is forested hilly areas with ample water availability. Their fecal pellets are characterized by a barrel shape, the base of which is flattened to concave in shape. The tip of the pellet tapers to a flattish point. Adult sambar pellets range in size from 1.5 to 2cm in length and 0.8 to 1.4cm in diameter. Small size pellets from young sambar can sometimes be confused with chital pellets due to overlap in size.

### **CHITAL**

Chital are restricted to flattish or undulating forested terrain. They normally avoid steep hilly terrain. Their fecal pellets are cylindrical with the bottom end rounded and the apical region tapering to a point. Adult chital pellets range in size from 1.2 to 1.8cm, but are much slender in comparison to sambar and nilgai pellets. In degraded areas chital pellets can be confused with goat pellets.

### **NILGAI**

Nilgai occur in open forests, scrub and thorn jungle, and degraded areas. They can also be found at low densities in prime forests. Nilgai have a tendency to defecate at fixed Latrine sites forming dung piles. The fecal pellets of nilgai are similar in size to sambar but are distinguished by a cylindrical shape with flat or smooth angular surfaces. The base of nilgai pellets is not as flat as that of sambar. Adult nilgai pellets 1.5 to 2cm in length with a diameter of 1 to 1.4cm on the average. The color is often dark brown to blackish.

### **BARKING DEER**

Barking deer pellets are Likely to be found throughout forested areas except in dry forested tracts. The fecal pellets are elongated and crinkled often with a twisted Look and dented surface. The pellets taper towards both ends giving a spindle shape, the tips vary from being long and hook like to blunt. In a clump it is often common to encounter a Large variation in size and shape between individual pellets from the same animal. They range in size between 1 to 1.8cm and about 0.4 to 0.7 cm in diameter.

## **CHOWSINGHA**

Chowsingha pellets are small in size. They vary in shape, being ovoid or slightly elongated. The Length of the pellets vary between 0.6 to 1.2cm and the diameter is between 0.6 to 0.8cm. There is a distinct habitat separation between chowsingha and blackbuck and therefore there is less Likelihood of confusing the pellets of the two species. Often habitats of chital, chowsingha and barking deer may overlap.

# Vulture & Other Birds Form

## Appendix-IV

### Form-5

Observer Name: .....

Date: .....

Forest division: .....

Range: .....

Beat: .....

SL No.	Bird Species Seen*	Number	Activity (Flying/ Roosting/ Feeding)	Habitat Type	Remarks
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

\*Mention species identity only if you are sure, otherwise mention large or small vulture, red head, or other description of colour in remarks column.

1. Are you aware of any vulture deaths in your beat within the past 3 years? Yes/ No.
2. Are there any active vulture nests in your beat? Yes/ No.

If yes, How many ..... On trees ....., on hills / cliffs.....

**Initialization Procedure for GPS Units**

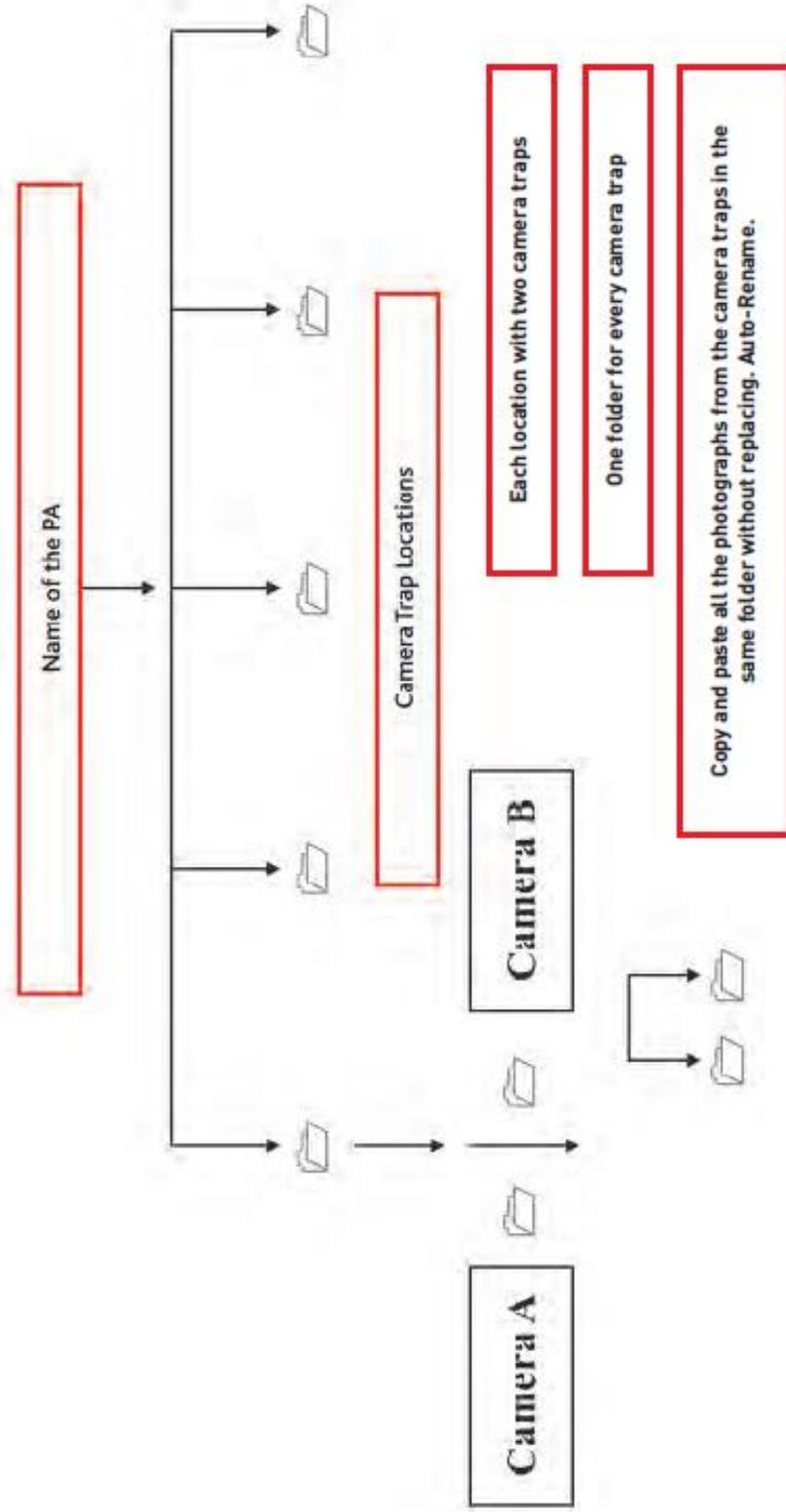
1. Step 1: Press power button to switch on the GPS unit
2. Leave the unit on in view of the open sky for 15-20 minutes when first switched on after several days.
3. Go to main menu by pressing Page button or Menu button depending on the GPS unit.
4. Select Setup from the Sub menu
5. Select Navigation from the Setup menu
6. Highlight position/location menu by pressing enter
7. Use arrow keys to scroll through the options and select hddd'MM" SS.S"
8. Now Highlight Map Datum and select WGS 84 by pressing enter and scrolling through by the arrow keys.
9. Highlight units and select metric units [in the same way as done above).
10. Highlight Heading and select True or Auto.
11. Quit the Navigation Menu
12. Select system setup and set date, time etc. [the Indian time is +5:30 hrs offset from GMT). In offset feed in 5:30 to get correct local time displayed by the GPS unit instead of the GMT time.
13. Report the GPS coordinates in degrees, minutes and seconds in decimals.

## FORMAT FOR ARRANGING CAMERA TRAPS DATA

APPENDIX - 6

### ILLUSTRATIONS OF THE FOLDER STRUCTURES IS PROVIDED BELOW:

Camera Trap Pictures (in separate folders as .jpg format)





**Monitoring System for Tigers -  
Intensive Protection and  
Ecological Status**



**भारतीय वन्यजीव संस्थान  
Wildlife Institute of India**

CHANDERBANI,  
DEHRADUN  
UTTARAKHAND

[www.wii.gov.in](http://www.wii.gov.in)



**NATIONAL TIGER  
CONSERVATION  
AUTHORITY**

B-1 WING, 7TH FLOOR,  
PT. DEENDAYAL ANTYODAYA BHAWAN,  
CGO COMPLEX, NEW DELHI-110003.

[www.projecttiger.nic.in](http://www.projecttiger.nic.in)

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[mSPC@9412052154](mailto:mSPC@9412052154)