

**Japan International Cooperation Agency (JICA)
Department for Forestry Development (DFD),
Ministry of Agriculture and Rural Development (MARD),
Socialist Republic of Viet Nam**

**TECHNICAL MANUAL
ON
WILDLIFE (MAMMALS) SURVEY**

**Technical Manual Series on
the Feasibility Study on the Forest Management Plan
in the Central Highland in Socialist Republic of Viet Nam**



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**Japan Overseas Forestry Consultants Association (JOFCA)
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Acknowledgement

This manual is prepared for the technical staff of Kon Tum province and surrounded provinces for forest management planning. The foresters are expected to use this manual for baseline survey and monitoring for biodiversity conservation. The situation of wildlife and list of fauna is recorded on the supplemental data book (CD) prepared by the study team.

This manual consist tow parts. The first part introduces how implement field survey to make records what kinds of species that are expected to exist. And the second part explains main species of mammals recorded by the study team in Kon Plong forest areas.

Contents

Part I Method on wildlife survey (Mammals)

- 1 What is biodiversity conservation?
 - 1.1 Biodiversity Viet Nam
 - 1.2 How to recognize “Biodiversity”
- 2 Wildlife survey
 - 2.1 Expected output from the survey
 - 2.2 Preparation
 - 2.3 Data collection
 - 2.4 Data evaluation
3. Field activates
 - 3.1 Baseline survey
 - 3.2 Interview survey
4. Monitoring

Part II Base knowledge on Mammals in Kon Plong

- 1 Explanation of main mammals
- 2 Animal list in Kon Plong
- 3 Endangered or rear animals in Viet Nam (IUCN Red List)

Part I Wild animal (Mammals) survey

1 What is biodiversity conservation?

1.1 Biodiversity in Viet Nam

Viet Nam has a land area of 329,566sq.km with a length of some 1,000km stretching from 830'N in the south to 23N in the north. The exclusive economic zone has an area of about one million sq.km. Three quarters of the country consists of hills and mountains reaching up to over 3,000m above sea level.

The country is S-shaped with broad deltas of the Red River in the north and the Mekong in the south, linked by a narrow central section. The Hoang Lien Son Mountains in the northwest of the country are the highest peaks in the country and Phansipan rises to 3,143m. These mountains form an extension of Hengduan Mountains of China and are biologically related to southwest China. The mountains to the east of the Red River are connected to the limestone ranges of Guangxi and are biologically related to southern China.

The narrow eastern coastal plains and hills are a distinct biological unit, endemic to the country. The discontinuous central mountain chain is also very distinctive especially in the plateau around Dalat. Some parts of the central highlands lie on the west side of the Annamite chain and drain into the Mekong. This area is seasonally dry.

Both the Red River and the Mekong deltas were formerly occupied by swamp forests, and parts of the Mekong delta support *Melaleuca* forests. Low lying dry land forests were semi- evergreen but are also largely destroyed. Hill forests remain of both

evergreen and semi- evergreen types.

In some areas of the north and center of the country, karst limestone produces spectacular scenery as well as a distinct forest formation. Montane forests grade from oaks and chestnuts mixed with conifers to upper montane forests dominated by conifers and with an understorey of bamboo. The highest peaks of Hoang Lien Son emerge above the cloud layer, receive very high levels of insolation and exhibit specialized xerophytic montane heath vegetation.

Viet Nam contains a great wealth of biological diversity in its forests, its waterways and in its marine areas. It also contains a great variety of valuable species and varieties of crops, cultivars and domesticated animals in its agricultural systems. This richness is shown in absolute numbers of species.

Comparison between the number of species in Viet Nam and the world

Taxa	Number of species in Viet Nam (SV)	Number of species in the World (SW)	SV/SW (%)
Mammals	265 [†]	4,000	6.8
Birds	800 [†]	9,040	8.8
Reptiles	180 [†]	6,300	2.9
Amphibians	80 [†]	4,184	2.0
Fishes	2,470 [†]	19,000	13.0
Plants	7,000*	220,000	3.2
Mean percentage of global biodiversity			6.2

* estimated to be 12,000

These resources are important for the welfare of the population today and hold vast potential for the future. Forest cover regulates the hydrological regime on which the success of the vital rice harvest depends. Over a thousand medicinal plants are recognized and many more certainly await discovery. It is estimated that Viet Nam has about 12,000 species of higher plants but only 7,000 have been identified. In a WCMC

assessment, Viet Nam was rated as the 16th most biologically diverse country on in the world.

In addition, Viet Nam contains globally important populations of some of Asia's rarest animals, such as Kouprey, Javan Rhinoceros, Asian Elephant, Tiger, Eld's Deer, Crested Argus and Green Peacock. Animal species considered by IUCN to be globally threatened are listed in Part II comprises a series of summary accounts of available information for globally threatened mammals that are found in Viet Nam.

Information on the occurrence and abundance of marine turtles in Viet Nam is mostly dated and incomplete. Five species occur in the South China Sea: Green Turtle *Chelonia mydas*, Hawksbill *Eretmochelys imbricata*, Loggerhead, *Caretta caretta*, Olive Ridley, *Lepidochelys olivacea* and Leatherback *Dermochelys coriacea*. All are recognized as globally-threatened species; the Loggerhead is categorized as Vulnerable, the others as Endangered (more seriously threatened).

Note: Biodiversity profile of Viet Nam of this chapter is referred from a report compiled by WCMC in 1994. (<http://www.unep-wcmc.org/infoserv/countryp/vietnam/>)

1-2 How recognize bio-diversity

1-2-1 Criteria and indicator of IUCN

The general understanding on Bio-diversity and how grasp the biodiversity is defined by IUCN (International Union for Conservation of Nature: Established under the United nations for Environment Protection (UNEP)) through their Criteria and Indicator. Following paragraphs show the understandings.

Biodiversity encompasses organization at levels ranging from complete ecosystems to the chemical structures that are the basis of heredity. Maintenance of natural genetic and ecosystem diversity across the landscape is the key to ensuring that species maintain

viability through their capacity to evolve and adapt to change. Maintenance of the natural range of ecosystems, and the ability of their components to react to external forces and processes, provides the equilibrium required for the maintenance of species diversity. Diversity is therefore inseparable from the generation and maintenance of ecological patterns. Impacts are evaluated through vulnerability assessments which may, in turn, suggest change in the ways forests are managed, or even dictate that action be taken in respect of the restoration of biodiversity.

Ecosystem diversity

Ecosystem diversity is the variety and pattern of communities and ecosystems. Maintenance of the variety and quality of the earth's ecosystems is necessary for the preservation of species. Without sufficient quantities of their natural habitats, species become vulnerable.

- Percentage and extent, in area, of forest types relative to historical condition and to total forest area
- Percentage and extent of area by forest type and age class (ref. 2.2.1)
- Area, percentage and representativeness of forest types in protected areas
- Level of fragmentation and connectedness of forest ecosystem components

Species diversity

- The greatest and most readily recognizable form of bio-depletion lies with species extinction. Slowing down the rate of species extinction due to anthropogenic factors is a key objective of the conservation of biodiversity. Changes in species population levels may also provide an early warning of changes in ecosystem integrity.
- Number of known forest-dependent species classified as extinct, threatened, endangered, rare or vulnerable relative to total number of known forest-dependent species
- Population levels and changes over time of selected species and species guilds

- Number of known forest-dependent species that occupy only a small portion of their former range

Genetic diversity

Genetic diversity, or the variation of genes within a species, is the ultimate source of biodiversity at all levels. It is the material upon which the agents of evolution act. Loss of variation may have negative consequences for fitness and prevent adaptive change in populations.

- Implementation of an in situ /ex situ genetic conservation strategy for commercial and endangered forest vegetation species

http://www.nrcan.gc.ca/cfs/proj/ppiab/ci/fra1_e.html

1-2-2 Bio diversity for foresters

No one would deny the fact that biodiversity conservation is an important factor in sustaining the biosphere, of which the human race forms a part. The means of protecting biodiversity within economic activity, however, is not necessarily defined clearly. The activities of many industries themselves pose a threat to biodiversity, with wildlife habitats being converted to farm fields and industrial sites. It is generally believed that forestry is an industrial activity that maintains and develops forests, improving the wildlife habitats. High-productivity forests regarded, as ideal by the science of forestry, which can sustain timber production, are quite similar to those regarded as ideal by the science of ecology, or from the viewpoint of sustaining the ecological cycles of the forests. In actual forest management, however, the development and maintenance of such "ideal" forests has not been achieved yet.

Amid growing awareness that the maintenance of biodiversity is essential to the sustainability of the human race, more attention is being paid to the maintenance of forests, which are regarded as the primary reservoir of biodiversity among the other

types of existing ecosystems. Foresters today are required to perform two types of tasks. One is, of course, to ensure the sustainability of timber production. The other is to ensure that timber production will not affect forest ecosystems.

Offices responsible for formulating the forest management plan are required to be accountable for how the plan responds specifically to the requirement for conserving biodiversity—an indispensable prerequisite of forest management planning. After the implementation of the plan, they are also required to prove how the plan has contributed to the maintenance of biodiversity or whether the plan has avoided having a negative impact on biodiversity.

The chief objectives of wildlife surveys are to assess the impacts (positive or negative) of such forest management on biodiversity, to obtain information that will constitute a basis for the subsequent forest management plans, and to develop indicators to be used to assess the outcome of the activity of producing forest products.

This manual introduces a simple method of carrying out wildlife surveys for mammals only. Wildlife in the strict sense of the word includes soil fauna and fungi as well as plants, wild birds, insects, and reptiles. However, it has been considered too much of a burden on foresters to carry out a field survey that verifies the presence, population and habitat factors for every species of wildlife. This manual therefore regards changes in the distribution and population of mammals in the region as an indicator for changes in local biodiversity. This is based on the understanding that the diversity of mammals, and the maintenance and restoration of a certain population of these animals, which are positioned in the upper levels of the food-chain, depend on the diversity of the forest ecosystem as a whole.

The manual has been compiled based on a technical manual for citizens carrying out similar surveys in Australia (Carlton Claire, *Community Biodiversity Survey Manual*

(*Second Edition*), National Park Association of NSW, 2001), as well as the findings of the survey that the study team conducted in Kon Plong.

2 Wildlife survey (Mammals)

The type of wildlife survey referred to here aims primarily to find out what types of mammals inhabit the target forest areas. Many mammals are nocturnal, travel long distances and hide in obscure places. One common method adopted by researchers in following the behavior of such animals is to install sensor-activated flash cameras in many parts of the forests and to analyze the pictures of the animals as they pass in front of cameras, which are also used to take a record of the date and time. Another common method is to attach transmitters with a built-in GPS to the animals in order to track them 24 hours a day. It is impractical, however, for the foresters to carry out such a comprehensive survey, due in part to the costs involved. This survey, therefore, draws more on interviews with local residents and the results of hunting practices, including the taking of trophies, in order to infer the types, populations and habitats of the mammals in the target forest areas. This manual provides details of how to assess this indirect data and explains a method for conducting a relatively simple form of field survey to confirm the presence of the target mammals in the areas. It should be noted that such a survey method draws on the findings of past surveys and studies, as well as requiring sufficient knowledge of the forest environment and of the historical changes in land use and other socioeconomic conditions. It should be emphasized that the field survey is designed to verify such records and assess the overall situation and that searching for the mammals with binoculars or ensnaring them without prior knowledge of their ecological role is not part of the survey.

2.1 Flow of the Survey

Figures 1 and 2 provide a conceptual flowchart of the survey. The survey begins with document retrieval. The survey should cover the forest areas that are the target of forest management planning and their surroundings. More specifically, it should cover a relatively small area (1- 50,000 ha), such as an area under the jurisdiction of the Forest Enterprise or a specific protection area. It is highly likely that the forest management planning envisions covering a forest area that includes hamlets. The area that is envisioned is not a trackless forest but an area isolated from cities and rural areas with a relatively large population. It is often a forest designated as requiring ecological protection or a forest area adjacent to a national park.

Again, the wildlife survey begins with collecting information regarding the academic surveys on the wildlife in areas surrounding such as national parks, as well as in ecological protection areas and in other protected areas.

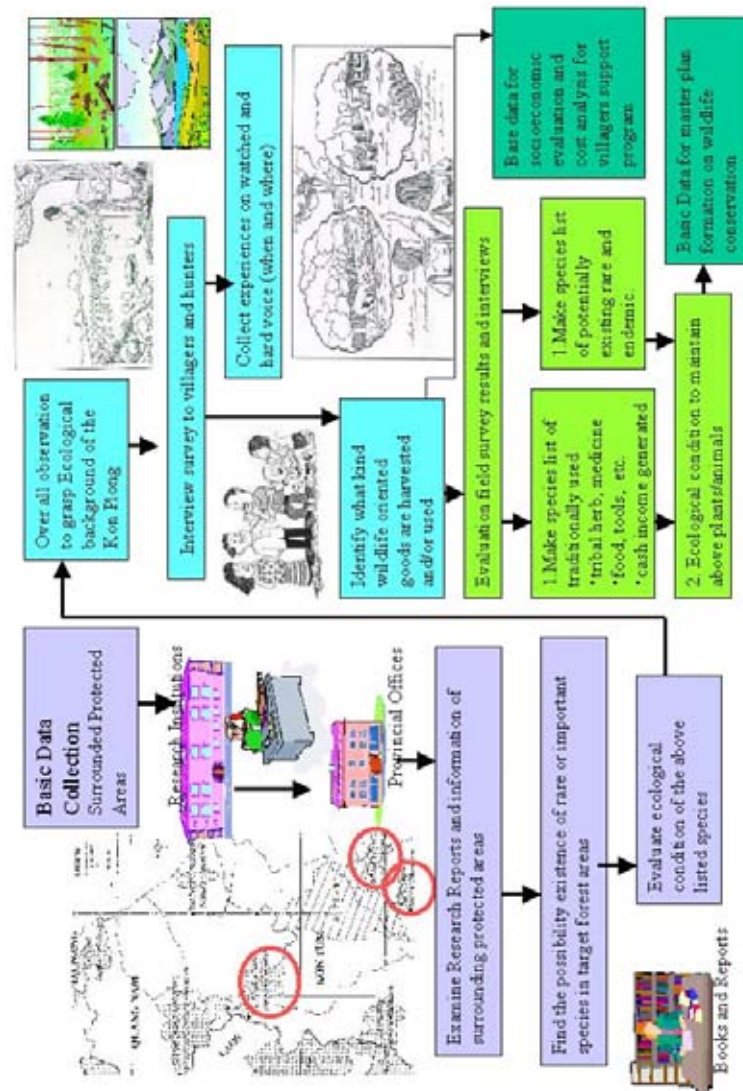


Figure-1 Flow of Animal survey 1

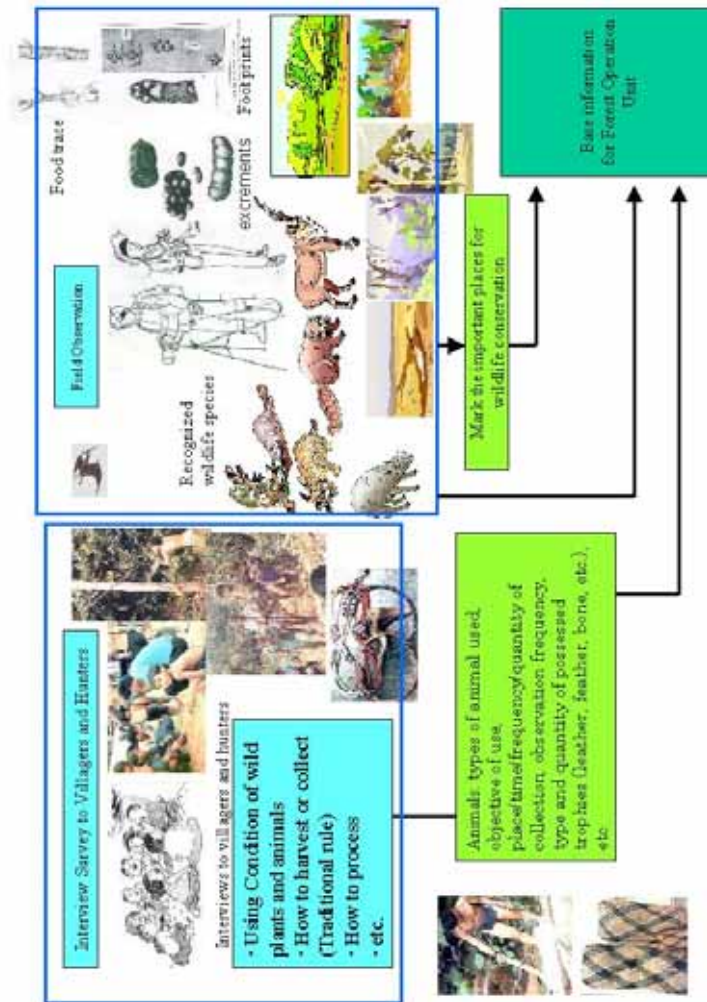


Figure-2 Flow of Animal survey 2

2.2 Collecting information

Collecting literature and other forms of information is the first step in a wildlife survey. The type of information required depends on the objectives of the wildlife survey. The first objective of this particular survey is to assess the distribution and population of mammals relevant to forest management planning and then identify the environment required to protect the mammals and the specific areas required to maintain that environment. The second objective is to gather information that constitutes a basis for assessing the positive and negative impacts of the forest management plan on the conservation of local biodiversity. The following information should be gathered:

- (i) The history of land use in the target areas
- (ii) The long-term regional development plan concerning land use
- (iii) The findings of past wildlife surveys in the target areas and the surrounding protection areas
- (iv) 1:10,000 topographical maps, existing vegetation maps, land use maps, weather maps
- (v) Administrative maps and socioeconomic statistics (specifying the village names, the number of households, the area of rice paddies, and other data)

A list provided by the Study team (see Annex) serves as a good reference for the animals thought to inhabit the Kon Plong area. To obtain dependable information on past animal surveys, it is advisable to refer to the agencies that manage the neighboring protection areas or to the following institutions, as well as the WWF Hanoi office. Interviewing the authors of various reports concerned (experts at Vietnamese research institutions) is also highly effective for survey planning. In addition, seeking advice and guidance on survey planning and implementation from such experts is preferable in that it is possible to obtain opinions different from those of the foresters.

National University of Hanoi Zoological Museum
Faculty of Biology, Vietnam National University, Hanoi
Forest Planning and Inventory of Viet Nam, Hanoi

Socioeconomic information is crucial in planning interviews with local residents and hunters since it serves as a basis for deciding on the question items (or the interview procedures).

2.3 Survey Planning

The next step after collecting basic information is to plan a field survey, and secure the necessary personnel and equipment. Such a survey plan must embrace safety measures for the fieldworkers, including liaison arrangements in case of emergencies and the preparation of emergency kits and anti-snakebite sera and anti-malarial drugs. This is because field surveys involve hard work and the risk of disease or injury. The fieldworkers stay in the forests for long periods at a time and much field observation is carried out during the night or early in the morning. In addition, in Vietnam, many people lay snares in the forests to catch birds and animals.

2.3.1 Places for field observation

In survey planning, it is vital to determine when, where, and how long the field survey will be conducted depending on the types of the mammals to be surveyed. A baseline survey is an appropriate way to verify what types of animals inhabit a given area. In a baseline survey, the first step is to confirm the distribution of the various types of ecosystems in the survey area. The second step is to understand the characteristics of each ecosystem (the vegetation type or the forest type—an evergreen forest, a coniferous forest, a marsh, a lakeside forest, a windy grassland, etc.). The third step is to set up baselines that contain different types of environments. The fourth step is to observe animals directly or search for traces of them. The final step is to figure out the

type and population of the mammals inhabiting the survey area. The following points should be considered when selecting the survey area:

- (i) The survey area should contain two or more habitat types.
- (ii) There should be no possibility that the access to nor the environmental conditions in the survey area will change drastically in the near future as the survey baselines will be used in future monitoring of the state of the forests. For example, it is problematic if a district road will cross a baseline under the regional development plan.
- (iii) An observation base should be established for each vegetation type in the case of a detailed survey or observation using fixed plots.

Transects are set up in the selected survey area for actual observation. The requirements for such transects are as below:

- (i) Each transect should be established within an environmentally uniform area. For example, it should not be half in forest land and half in grassland.
- (ii) Each transect should be established within an area that is uniform in terms of topographical features, such as a hillside slope or a lakeside flatland.
- (iii) The location of each transect should be selected on the map in advance.
- (iv) Wherever possible, two or more transects should be established for each forest environment.
- (v) Transects should be sufficiently far from roads or other locations where drastic changes in vegetation are likely.
- (vi) Transects should be established where the presence of the target mammals is likely.

Note: For a detailed survey, it is preferable to place observation sites using the random sampling method. This method makes it possible to process the data

statistically while ruling out arbitrary judgments on the part of field workers. At any rate, note the risk that the obtained data may be distorted due to a possible gap between the planned and the actual survey points. In the planning process, some survey points will be established in hinterland that is quite difficult to gain access to. In the implementation process, however, such points tend to be shifted toward more accessible areas or areas where animals are more likely to be present.

2.3.2 Timing for field observation

There is no recommended season when a field survey, or at least a baseline survey, should be carried out. Nonetheless, some factors should be considered when deciding on when to carry out a field survey. The season when the targeted mammals are active should be considered. The season when it is easy for the field workers to carry out their duties should also be considered. For example, the rainy season should be avoided for the sake of efficiency. The breeding season for the target mammals, if they are known, should also be considered. It is preferable to conduct short-term surveys several times rather than to conduct one survey that lasts for a certain length of time. If a field survey is conducted in each season or every time a phenomenon that significantly affects the local ecosystem (a heavy rain, a forest fire, etc.) occurs, then it is possible to follow and even predict changes in the dynamic patterns of the movements of the mammals in the region.

The possibilities for mobilizing field workers and obtaining the cooperation of local residents should also be considered when deciding on the timing of a field survey.

2.3.3 Organizing survey team

A field survey consists of a survey designed to confirm the actual presence of animals as well as traces of their presence, and an interview survey of hunters and local residents. The study team is made up of a team leader who directs these two different

surveys, advisors, and field workers. An advisory group is also organized separately to supervise the overall management of the survey. It is essential for the advisory group to ensure coordination with all the parties concerned, confirm licenses and other authorization or follow the necessary procedures to obtain them.

The post of team leader is naturally assumed by a staff member of the office in charge of the surveys, or more specifically, a DFD official in the province. He or she should preferably be an official responsible for drawing up or approving a forest management plan, although this post may be assumed by an expert from an NGO or similar organization. Such a DFD official should preferably have experience of participating in similar surveys conducted in cooperation with an international institution or a donor country. In reality, however, there are limited numbers of such personnel, and a person who is quite familiar with local animals may also assume the post. This is where advisors, who effectively direct the survey, can play an important role. It is most practical for the post of such advisors to be assumed by experts at the above-mentioned institutions or universities who are engaged in research and studies on wildlife in Vietnam. Conducting a preliminary survey with these advisors to learn the survey methods and acquire the experience of identifying animal species will substantially help the team leader enhance his or her qualifications for carrying out the surveys.

The field workers are made up of group leaders, assistant observers and local guides. They are selected from among the employees of the Forest Enterprise and the Commune, volunteers, and local residents. Local residents experienced in hunting are encouraged to serve as guides. This kind of cooperation from local residents is important for improving the accuracy of the field survey. The field workers should receive training from the advisors in identifying animal species, the environments they inhabit, and their traces. They should also acquire other knowledge and field training before participating in a field survey.

The number of survey groups within the survey team will be determined by such factors as the survey period, the area to be covered (the number of transects), and the effectiveness of the preliminary field training. It is practical to calculate the number of such groups based on the number of transects, which is determined in the planning process. Observation activities should be continued for a certain period of time along the transects, whose locations are identified in the planning process as well. Due to limitations on the availability of human resources, the replacement of some team members is unavoidable to ensure such continuity. Volunteers, including NGO members or students, are encouraged to participate in order to cover any shortfall in the full complement of personnel required. Arrangements should be made to provide technical training to such volunteers as well.

Since the survey activity covers a wide area, it is necessary to have prior consultations with the parties concerned, especially the competent offices in the district and commune. Maintaining close liaison and coordination with them and informing them of the progress of the survey is also important. These tasks are performed by the advisory group, which is essential for smoothly conducting the survey activity.

In the observation activity, skeletons, hair and scats are some of the important items of evidence of the presence of mammals. Since identifying the animal species based on such evidence requires specialized knowledge and equipment, including microscopes, these specimens are usually sent to a research institution for analysis. This is why representatives of such institutions are encouraged to serve as advisors or to join the advisory group. Their contribution is highly effective in improving the efficiency and accuracy of a field survey.

2.3.4 Prepare materials

Accurate recording of the locations and the environments of the survey points is required to ensure the accuracy of the field survey. Sorting and classifying samples

such as skeletons, hair and scats are also required to achieve this. To perform these tasks in the transect survey, the following equipment should be prepared:

- Binocular
- Compass
- Topographic map
- Aerial photograph
- Clipboard and writing material
- Field note for recording observed matter
- Small plastic bags for keeping Scat and other material Collected
- Guidebook for identification of species
- Permanent marking pen (Black)

3. Field activities

The survey activities in the field include gathering information from local residents and hunters, field observations and field investigations. Interviews with local residents are conducted with the aim of collecting materials (hunting records/memories and trophies) on which to determine the pattern of animal habitation in the past. These materials make it possible to improve the efficiency of the baseline survey since they constitute a basis for identifying the species that are likely to inhabit the survey area and the locations where the presence of such animals is also likely. Interviews with local residents also need to prompt them to cooperate in the field survey.

Interviews for collecting information/data on the habitat conditions for wild animals have to be conducted not only with villagers but also other resource persons. Village elders, heads of other hamlets and people of different economic groups in the hamlets, such as teachers, soldiers, agricultural extension workers and local authorities, have many chances to hear from villagers about wild animals during their terms of duty in

the villages.

As far as possible, the interviews should be conducted with non-professional hunters who come from other communes. Usually, villagers who hunt intermittently and come from other communes have substantial knowledge about the status of wildlife in the hunting areas (which is why they come to the commune forest).

Note: Interviews are not only for the purpose of data collection, but also to provide a chance to inform local people about the importance of conserving wildlife, the role of wildlife in nature and the environment, and the environmental laws and regulations.

3.1.2 Careful examination of the interview results

In most cases interviews with local people do not always reveal the actual situation, since sometimes such local people might report on their experience circumspectly to protect themselves. The interviewer must pay careful attention to the trophies and hunting tools they keep for verification and inspection of their explanations. In order to verify their comments it is necessary to ask to see hunting tools, hunting sites, or the remains of the hunt.

3.1.3 Procedures for interview surveys

(1) Securing cooperation in the survey

An interview survey requires prior approval from the relevant commune as appointments for interviews in the villages are arranged through the commune. After obtaining approval from the commune, the survey team meets the village

heads to explain the purpose and provide an outline of the survey and request them to introduce typical villagers, experienced hunters and villagers who are familiar with local animals. Then the team arranges appointments with these people, specifying the time and place for the interviews. It is advisable that the team carries a document showing that the commune approves the interview survey and calls on the villages to cooperate in it. The team must adopt an amicable attitude and ask for cooperation from the village leaders. This procedure for securing the cooperation of the commune and the villages is also applied in the transect survey discussed later.

(2) Factors to take into account

a. In relation to the villagers

The interviews are conducted in the homes of the villagers. The interviewer should reconfirm the appointment before visiting the home of any villager for an interview. When interviewing several villagers at a time, the interviewer should elicit the opinions of as many people in the group as possible. The time for the interview should preferably be in the evening after the farm work for the day has been done. The season for interviewing should be decided according to the farm work calendar. Depending on the season, the villager may stay in a farming hut in a remote area and not return home during that period.

The interviewer should allow sufficient time for the interview and must refrain from pressing for an answer. It is necessary to make the interviewee feel relaxed by, for example, making small talk from time to time in order to elicit what the interviewee really has to say.

b. For hunters

Since hunting is essentially prohibited by law, the hunters can also be described as poachers. Many hunters know this. They do not always say what they really mean or know for fear of being reported to a low level enforcement officer. The interviewers are required to ensure that the interviewees understand that their interest is only in learning about the status of the local animals, not in restricting poaching activities. The interviewer should therefore avoid asking sensitive questions and make the interviewee feel at ease by, for example, changing the subject when the interviewee is stuck for an answer. Questions like “Do you think it is alright to poach?” will make the interviewee become unwilling to talk. In short, the interviewer should make the interviewee feel comfortable and should not create misgivings about the interview.

Special attention should be paid to small animals. Some small animals have different names. The interviewee may also not know the names of such small animals in the first place. Therefore, pictures or drawings of small animals that may inhabit the survey area should be presented to the interviewee to ensure the accuracy of the survey.

The procedures for the interview survey are given below:

- (i) Make a list of experienced hunters in the village.
- (ii) Select the villagers for interviewing taking into account the category of animal that they hunt (deer or other large mammals, or small mammals such as squirrels, as well as birds, etc.).
- (iii) Show the hunters a map on a scale 1:50,000 or 1:100,000 and request them to point out the place where they saw the animal.
- (iv) Ask to see the hunting equipment and types of traps used.
- (v) Request to see any collections of trophies.
- (vi) Prepare a field notebook to record the interview results.

Note: A sample form in the Field Notebook for Interviews is shown below.

Villager/Hunter Interview Sheet

No : 1001

Date : 21 May, 1997

Name : @@@@ **Category:** intermittent hunter **Age:** 41 **Ethnic group :** @@@@

Address : No.5 village, OOO commune, OOO province, OOO district.

Observed experience

Species	Numbers	Time of observation	Description of the natural conditions	Description of the location (Mountain, Stream, Distance/direction to other known locations, etc.)
Serow	3	3/1997	Deep forest/ Scattered grass	Mountain A, from village B 10 km to the east

Collected trophies and other remains

Species	Materials	Time of collection	Description of the collection location and the natural conditions	Description of the location (Mountain, Stream, Distance to other known locations, etc.)
Serow	3 heads bone	3/1997	Deep forest/ Scattered grass	Mountain A, from village B 10 km to the east

Note:

Describe the situation/conditions and/or opinion about recent conditions of the habitat where the animals live according to the hunter. Include other typical observations identified from the explanation given by the hunter.

3.2 Baseline surveys

The baseline survey consists of scat collection, searches for animal traces and field investigations (direct observation). In a detailed survey, automatic cameras, various types of traps, and tape recorders are placed along the survey transects. The tape recorders broadcast recorded animal sounds and record the response from animals living in the area. The recorded data is then analyzed to estimate the species of animals and their population levels. Special care must be taken to ensure that the traps do not cause injury to the target animals and that the wildlife survey will not effectively result in poaching. To this end, the team leader is responsible for directing and supervising the field workers. The traps should preferably be set under the direction and supervision of authorized technicians.

3.2.1 Setup the base line survey points

In a baseline survey, the presence of animals within the transects is estimated based on their traces (including scats) and visual recognition of the actual animals. The length of each transect can be 200 m, 300 m, 400 m, or 500 m.

Transects must be located within areas of uniform forest physiognomy (vegetation). If a sufficient area cannot be secured for a transect, the transect may be divided or shortened as shown in the following figure.

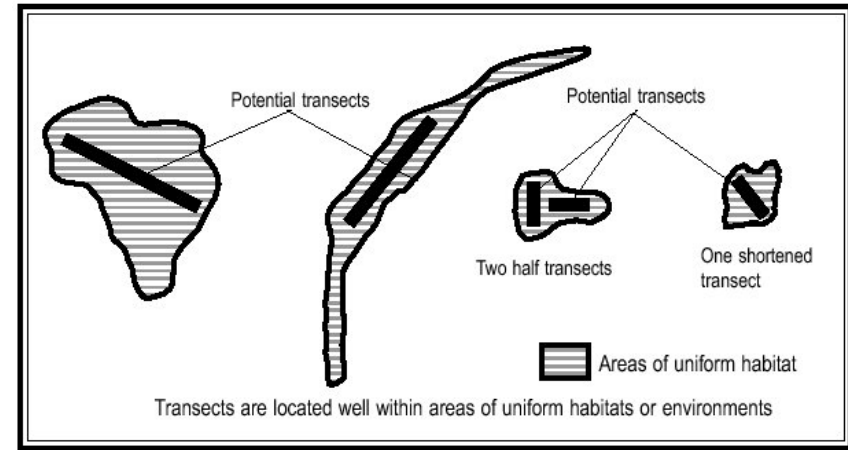
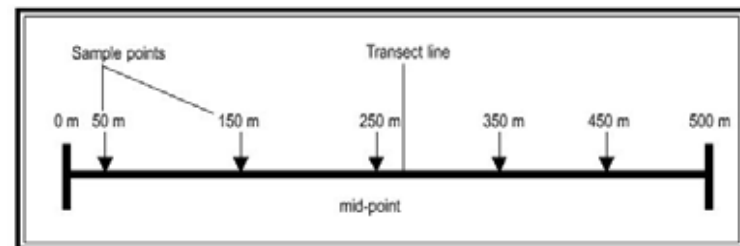


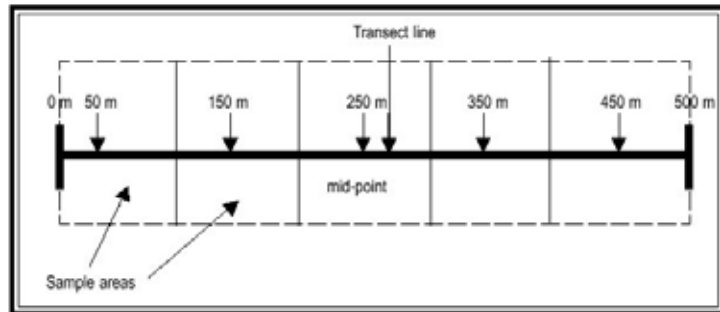
Figure Examples of the establishment of potential transects

A plastic indicator stake is hammered into the ground at the start and end points of the transect. Flagging tape is used to mark out these points as well as points at intervals along the transect line, so that these same points can be revisited for observations carried out at intervals of several days or months. A compass is used to ensure that the transect line is straight.



The transect is then divided into several blocks (sampling areas) as shown in the following figure. The standard size of the blocks is 50 m x 50 m, although the size, as

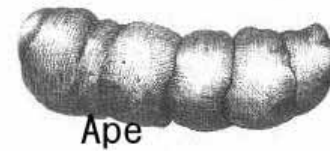
well as the number of blocks, depends on the number of field workers. Each block is marked with a number and then a transect map is prepared.



3.2.2 Scat collection

Observing scats is a highly effective and efficient way to survey animals. The shape and size of the scat is a key clue to identification of the sex as well as the species, and even to distinctions between adults and young animals. Detailed identification sometimes requires the analysis of traces of herbage and insects in the scat. Since such analysis requires the expertise of professional specialists, samples of scats are sent to a research institution for identification. Such identification is usually a paid service. It is therefore necessary to solicit financial support from supporting groups as discussed above.

Samples of Scat



New



The collected scats are placed in a paper bag that shows the collection date and time, location (transect ID), ecological conditions and other records, which is then sealed and sent to a research institution.

Considerations in handling scats:

- a. Do not handle scats with the bare hands.
- b. Do not store scats in plastic bags. They can rapidly go moldy.
- c. Ensure that the equipment used to handle scats does not cause injury. This can result in contracting tetanus or other diseases.
- d. Wash the hands and the equipment thoroughly after handling scats.
- e. Package the scats so that they will maintain their original shape before sending them to an expert.

3.2.3 Searching for animal traces

There are many mammals that leave traces of their presence. These include scats (that is, feces droppings), tracks, scratches on trees, diggings, shelters and bones. The methods of collecting information on all forms of mammal traces that are described in this section on searching for animal traces can be applied in all habitat types.

(1) Equipment needed

- Compass
- Topographic map of the survey area
- Clipboard, pencil and eraser
- Small notebook for making your own notes of special occurrences that are noticed
- Trace collection field data sheets

(2) How to conduct a search for animal traces

Collecting information on mammal traces other than scats is undertaken at the standard survey site or at any other time and place in the survey area when the

opportunity arises. Information should also be collected on other traces around hair balls.

Look for tracks or footprints in areas of soft soil or mud. Good places to look are around dams, puddles, or along the sides of dirt roads and vehicle tracks. Tracks are best seen in a slanting light, so searching in likely spots in the early morning or late afternoon is ideal.

Look for scratches on trees caused by arboreal marsupials such as gliders or possums.

Any skulls or other bones should be collected and the species identified by referring the material to experts.

When an animal trace is located that you wish to record, write the following details in the trace collection field data sheet:

- a. The site number indicated on the topographical maps or aerial photographs:
 - your name;
 - date; and
 - preliminary identification of the species, if known.

If you are collecting a skull or other bone fragments for later identification by an expert, then clearly label the specimens with an appropriate and unique field identifier and record that identifier on the trace collection field data sheet and send it to the expert.

Before sending any specimen away for identification, you must record a unique field identification number on both the specimen and on the field data sheet.

Always only send a copy of the trace field data sheet with the specimen, not the actual sheet.

When you find signs of the dwelling of a mammal, the best thing to do is leave it alone. This is the animal's home or territory and disturbing these sites in any way may cause unnecessary stress to the animal.

3.2.4 Opportunistic mammal sightings

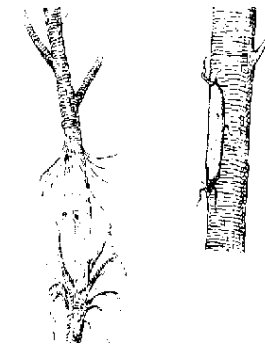
Many species will be detected while travelling to and from survey sites, or outside standard survey times or survey sites. Record all of these sightings and their locations, dates and times for the overall survey in an opportunistic animal sightings field data sheet.

This additional information is valuable as it helps to build the list of mammals recorded for each area. Some of the mammals you see outside the survey area or in the survey area, but not near a survey site, may provide some insight into how mammals utilise a number of habitat types.

You should describe the following items in your field data sheet

- a. Date of first observation: Enter the date of the first opportunistic observation in the field data sheet.
- b. Date of last observation: Enter the date of the last opportunistic observation in the field data sheet.
- c. Animal species name: Enter the common and scientific name of the animal.
- e. Number observed: Enter the number of individuals observed and indicate whether the count is an estimate.

- f. Habitat type: Enter a description of the habitat type (Deep forest, open forest, grass field, etc.)
- g. Breeding: Enter a code from the table provided in the Field Workbook that corresponds to indications you have of the breeding condition of the individuals. If you cannot identify their breeding condition, then leave this field blank.
- h. Locality description: Give a brief description of your observation of the locality.



3.2.5 Examples of field notes

Scat collection field note

Survey area		Date	
Survey team		Site ID	
Surveyor			
Landscape	Altitude	Topography	Vegetation
Sight Description			
Number on the index map			
Scat collection number	Micro habitat type	Animal species name	Notes

Opportunistic animal sightings field note

Survey area	Date
Survey team	Site ID
Surveyor	
or	

Name of species	Time observed	Number observed	Observation type	Habitat type	Locality description

Note: If you have a GPS, describe the site location by its latitude and longitude.

4. Monitoring

There are no set rules for when monitoring should be carried out. Nonetheless, it is desirable to conduct wildlife surveys at intervals of five years to monitor changes in the population of each species, since the period of most forest management plans in Vietnam is five years. The results of the monitoring should be compared with those of the first survey. Unless this is done, it is impossible to analyze and assess the forest management and logging projects as well as unplanned human factors such as poaching, illegal logging, and uncontrolled slash and burn cultivation. It is therefore indispensable to publish, store and manage the records of the original data in a strict manner.

There are no set rules for how to conduct a field survey for monitoring purposes either. Nonetheless, such a survey should preferably be conducted along the lines of the survey items identified in this manual. In this way, it is possible to compare the data from the first survey and that from subsequent surveys. It is also possible to estimate the species and number of animals that are expected to be hunted by the next survey, based on the interview surveys.