



TAMIL NADU ELEPHANT DEATH AUDIT FRAMEWORK

TAMIL NADU FOREST DEPARTMENT

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A large elephant with long, curved tusks is the central focus of the image. It is standing in a grassy field with a blurred background. The elephant's trunk is visible, and its large ears are on the right side of its head. The overall tone of the image is soft and natural.

Tamil Nadu

Elephant
Death Audit
Framework

India is home to over two-thirds of the World's Asian elephant population. Incredibly, they live alongside people across much of India, with only about 20% of their range inside protected areas. Yet their population is stable or even increasing in some regions. Wild elephant mortality occurs due to number of reasons, mostly natural but at times due to unnatural and preventable reasons. Elephants are among the most long-lived mammals, with life expectancy of around 50 years in the wild, and a generation length of 22 years. With rapid anthropogenic changes, the scenario of wild elephants peacefully co-existing with people sharing the same landscape has been affected. The impact created by the ever increasing human population and corresponding changes in land use and attitudes of people on life expectancy of elephants is unknown. A closer monitoring of elephant mortality is therefore very important in these times.



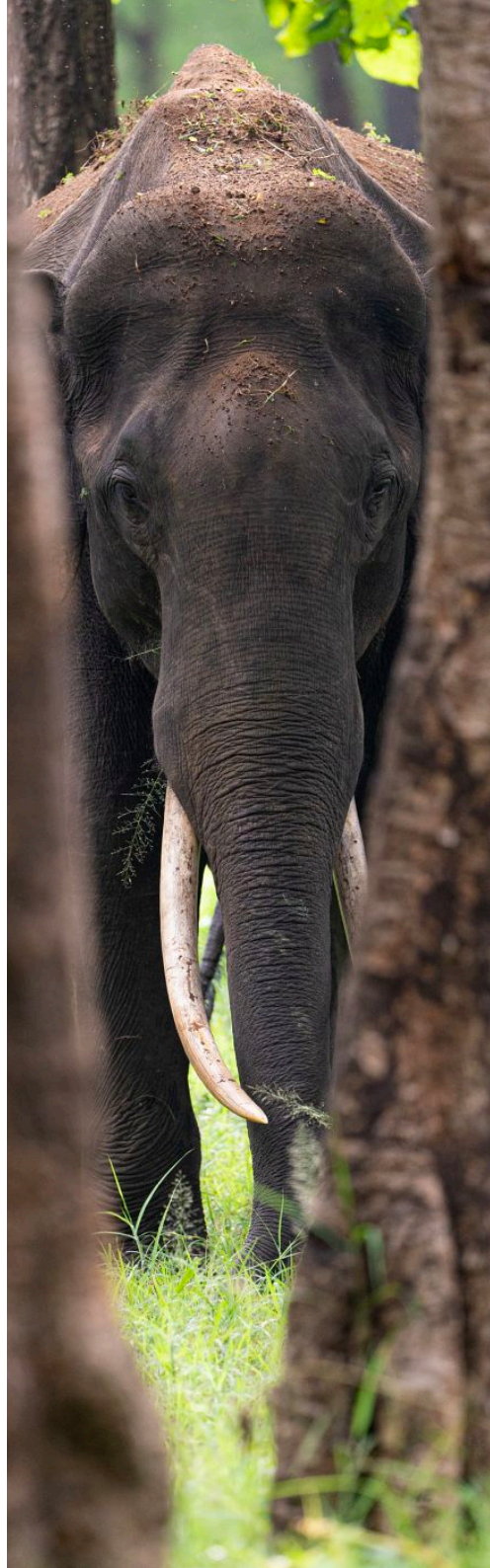


Many wild species show high mortality in young age. There is no robust baseline for Asian elephant mortality rates in a similar context to compare with. This baseline data is needed to determine whether these mortality rates are a cause for serious concern, or within acceptable limits to ensure persistence of the population in the long term.

While poaching rates have come down drastically in the last few decades, there remains a lack of clarity on natural vs. unnatural deaths of elephants, and how this is affecting the population in the long term. A more detailed and transparent process around recording and monitoring the death of elephants is therefore vital.

In order to conduct a detailed analysis of death of elephants in the wild for understanding issues relating to unnatural and preventable deaths and prescribe suitable management interventions, the Government of Tamil Nadu is implementing an Elephant Death Audit Framework (EDAF) in the state. This is the first of its kind initiative in the country. The broad objectives of Elephant Death Audit Framework (EDAF) are threefold, viz.,

- Prescribe a Systematic Standard Protocol (SSP) for conducting post-mortem to determine the reason(s) for death of an elephant.
- To study and understand the circumstances in cases of preventable and unnatural deaths of elephants.
- Formulate remedial measures for prevention of unnatural and preventive deaths by conducting periodical death audits and monitoring these over time.



1. Scope of EDAF

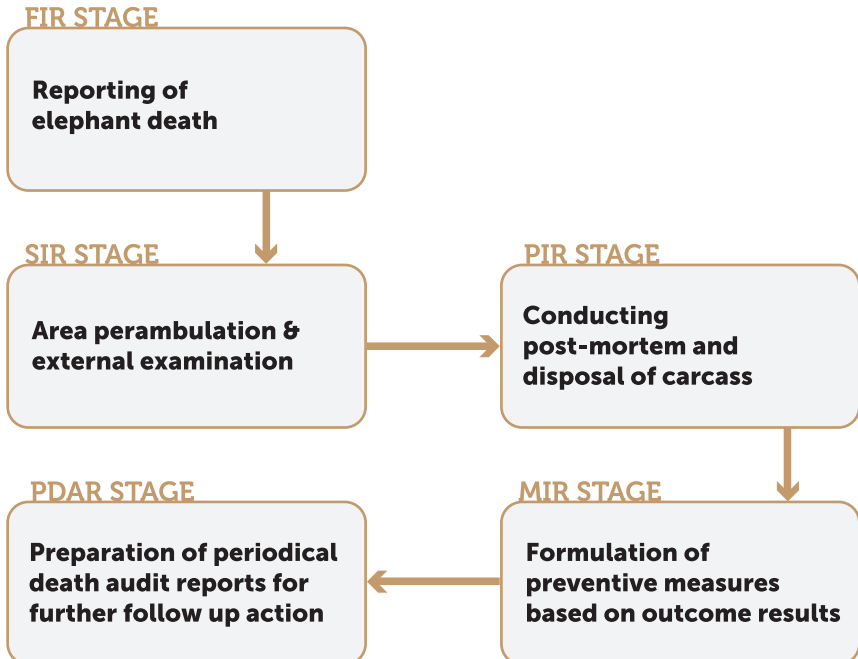
EDAF protocol will be applicable all over the state of Tamil Nadu for the reported deaths of elephants in the wild. It has to be uniformly followed in all wildlife areas and territorial divisions of the state.

2. Responsibilities

Deputy Director (DD) of Tiger Reserves, concerned District Forest Officer (DFO) or Wildlife Warden (WLW) in charge of a National Park or Wildlife Sanctuary would be responsible for adherence and implementation of EDAF in cases of death of wild elephants. Field Directors (FD) and Circle-in-charge officers (Conservator of Forests (CF)/ Chief Conservation of Forests (CCF)) would be responsible for ensuring compliance of EDAF protocol and conducting periodical death audits. EDAF would be implemented under the overall guidance of the Chief Wildlife Warden (CWLW), Tamil Nadu.

3. Stage-wise prescribed methodology for EDAF

The various stages of the EDAF protocol are presented in the flow chart diagram below. Stage-wise detail procedure is placed after the flow chart.



3.1 Stage I: Intimation of detection of a dead elephant and initial follow up action (FIR stage)

As soon as a dead elephant is detected in the wild or outside the forest area by field staff, the occurrence should be immediately intimated to the concerned Range Officer over phone. The details, such as, the time of detection, location, approx. age, sex and circumstances of the death shall be duly noted by the concerned Range Officer in the format appended as Annexure I. This initial report by the field staff, named as "First Intimation Report" (FIR) has to be prepared by the concerned Range Officer. It need not be technically sound but should give the basic details as accurately as possible. Soon on receipt of the FIR, the concerned Range Officer shall bring the matter to the attention of the concerned DD/DFO who shall, in turn, send a flash report to Chief Wildlife Warden and the Government.

The Range Officer shall make necessary arrangements for conducting post-mortem which shall include informing the concerned DFO/DD/Assistant Conservator of Forests (ACF), summoning the local departmental veterinary officer, inviting independent observers, arranging police bandobast for crowd control, etc., Simultaneously he shall instruct the local field staff to cordon off an area of at least 10–50 meter radius around the carcass to prevent compromise of vital death related signs and evidence. In case the carcass is found outside the forest area, the site must be properly secured, ensuring the presence of field staff at the site till the arrival of the post-mortem team. The guiding principle for the arrangements would be to commence the post-mortem exercise as early as possible for obtaining the best possible laboratory results. Early commencement of post-mortem is critical.



3.2 Stage II: Conducting the post-mortem exercise (SIR & PIR stage)

Post-mortem should commence only after all required officials are present and all necessary tools and equipment are in place. The post-mortem team must be provided with an all-terrain 4x4 wheel drive vehicle with facility for carrying both human resources and equipment. The list of essential tools and equipment that needs to be provided to the veterinarian and the Range Office is enclosed herewith as Annexure II.

The team shall consist of the following members:

- i. The concerned Dy. Director/District Forest Officer/Wildlife Warden.
- ii. Divisional ACF
- iii. Concerned Range Officer
- iv. Departmental Veterinarian and a Veterinarian from the Department of Animal Husbandry (if available).
- v. Non-Governmental experts on elephant ecology
- vi. A responsible functionary from the local EDC or VFC
- vii. Field staff well versed with post-mortem exercise

The concerned Field Director or Circle-in-charge officer may attend the post-mortem exercise if the need arises. The DD/DFO/WLW shall invite officials from the Department of Animal Husbandry, Revenue Department, local Panchayat, etc. for maintaining the required level of transparency of the post-mortem exercise.



In case the death of the elephant is due to electrocution, deliberate or accidental, post-mortem shall be carried out only after the arrival of officials from the local official from TANGEDCO. It will be incumbent on the TANGEDCO to depute officials on a priority basis to assist in post-mortem when death of elephants is due to electrocution. The entry point and the exit point (if possible) of the fatal current charge has to be determined and a provisional certificate regarding death of the elephant due to electrocution shall be issued by the TANGEDCO officials before commencement of post-mortem.

a. Preliminary Survey

Soon upon reaching the site, the team shall first carry out external examination of the carcass and perambulate the area around the dead elephant to draw possible scenarios in the area during the time of death of the elephant. This should be as objective and factual as possible, avoiding excessive speculation. The either side of the elephant must be examined before proceeding for post-mortem. Manual winch/ block and tackle system can be used to turn the carcass over if possible. When death occurs inside the forest area, effort should be to survey an area enclosed by 500-meter radius, including nearby water bodies, streams and river. The basic objective of area perambulation would be to determine if the death of the elephant is most likely due to natural or unnatural cause. In case the death of the elephant is suspected to be as a result of hunting or unnatural

reasons, an intensive crime scene investigation has to be carried out and action has to be initiated for detection and arrest of the assailants. The details of the condition of the carcass and the existing circumstances shall be duly recorded by the concerned DD/ DFO/WLW. This report will be filed as the Site Inspection Report (SIR). The format for Site Inspection Report is appended as Annexure IV. The check list for activities to be done prior to post-mortem is given in Annexure V.

b. Conducting post-mortem of the carcass and determining the probable cause of death

If the death occurred in areas where public have access, the area immediately around the carcass should be covered by erecting shade net for carrying out post-mortem to ensure dignity in death to the dead elephant. The practice of carrying out post-mortem in full public view/openly is henceforth stopped under the new protocol. A simple scaffold of shade net / nursery net with supporting poles shall suffice for privacy of the exercise. The first step would be to carry out external examination of the carcass. In case the animal is suspected to have died of Anthrax, SOP issued by Project Elephant Division, MoEF&CC in its advisory dated 31.12.2019 to deal with Anthrax cases should be duly adhered to. Copy of the prescribed SOP is appended here as Annexure VI.

For cases other than suspected Anthrax, a thorough external examination of the carcass should be conducted for general conditions

like appearance (good, fair, weak, cachectic or hide-bound), signs of bullet wound, post-mortem stage such as algor mortis, rigor mortis or livor mortis which shall give an idea of the approximate time elapsed after death; condition of the natural orifices (any discharge, prolapse), visible mucous membranes (normal pink, pale, red, yellowish), marks of external injury (fresh or old) or any other pathological lesions (abscess, growth, alopecia, exudative dermatitis, mange, ecto-parasites), congenital anomaly etc. Body measurements should be duly recorded. The approximate weight and age of the elephant can be calculated by using the ready reckoner Height-Age-Weight chart as shown in Annexure VII.

As most carcasses inside the forests are detected late and are often in highly putrefied condition and mutilated by scavengers as well, it is often difficult to ascertain the primary cause of death. In such cases, the details of the complete/incomplete body portion should be properly marked for further examination. In cases where the carcass has been found in an advanced state of putrefaction, the veterinarian shall try to determine the possible cause of death by observing external signs on the carcass and the situation of the area around it. In cases where the carcass has been partially mutilated by scavengers, the remaining parts of the body would be examined for necessary examination. In cases where only the bones have been recovered, the age and sex of the animal will be determined from the available skeletal remains.

Cutting open the carcass must be carried out only under the supervision of the attending veterinarian and under adequate light. The task of cutting open a relatively fresh elephant carcass is both laborious and a time taking exercise. Conducting a full post-mortem on such a carcass can take anything up to 3-4 hours. After cutting open the carcass with the assistance of experienced staff, all visceral organs should be closely examined and details of lesions observed should be properly noted. As the process of conducting post-mortem is time consuming, it is possible that the operation may extend beyond the daylight hours. In such cases, the concerned veterinarian can decide whether to continue post-mortem under adequate lighting arrangements. However, such a decision should be taken only after due consultation with the local field staff regarding presence of wildlife in the area. The objective would be to complete the post-mortem as early as possible by taking necessary precautionary measures. The tusks/tushes should be extracted from the carcass and should be handed over to the concerned RFO/ACF for safe custody. In case of tusks and tushes, the circumference of the tip, mid-point and base of the tusk has to be recorded along with its weight. The tail tuft of the animal should be burnt and the process should be video graphed for record.

All tissue samples should be collected and packed by the veterinarian as per existing standard practices and should be sent expeditiously to the

designated laboratories for further examination. The concerned DD/ DFO/WLW should ensure that samples are sent only to those labs that have necessary capabilities for submitting conclusive and quantified results. The emphasis will be on obtaining lab results as early as possible, especially in cases of suspected unnatural or preventable deaths. After completion of the post-mortem exercise, the remaining body parts would be either left in the forest for feeding by scavengers or buried when the post mortem has been carried out in a human habitation area. There may be situations where the local people may object to conducting a post-mortem in a human habitation area. In such cases, the carcass can be shifted to the nearest forest area or to some nearby vacant government land for conducting post-mortem. Burial or shifting of the carcass would require the services of an excavator some heavy earth moving machinery. The Range Officer concerned should make necessary arrangements for the same if such a need arises. The decision regarding the method of

disposal will be taken by the attending veterinarian in consultation with the forest officials. Whatever the site, post-mortem must be carried out only after scaffolding the carcass with nursery nets.

The entire exercise of site perambulation and post-mortem must be adequately documented by taking high resolution photographs and 4k video-clippings. Photography and video recording of the exercise shall be carried out only by a designated and trained photographer with appropriate camera and no one else will be permitted to take pictures/ videos excepting the attending veterinarian.

After completion of the post-mortem exercise and handing over of samples for further laboratory analysis, the concerned veterinary officer shall file a field report termed as Post-mortem Interim Report (PIR) where he shall record the basic details of the exercise including the possible cause of death. The format of PIR is appended as Annexure VIII.



3.3 Stage III: Follow-up action after receipt of lab results (MIR stage)

DD/DFO/WLW should take necessary follow-up action to obtain the lab results as early as possible. A copy of the lab report should be forwarded to the Chief Wildlife Warden for perusal and record, as well as to the results intimated to the entire post-mortem team. The exact cause of death shall be determined as per Annexure III. When the lab results conclude on unnatural death due to disease or some physiological ailment, the concerned departmental veterinarian shall suggest suitable remedial measures for prevention of such deaths. He may consult domain experts for formulation of appropriate preventive or remedial measures. He shall submit a detailed report of the entire episode of death, detailing the circumstances, post-mortem exercise, lab results and management intervention measures. This report is termed as Management Intervention Report (MIR). The MIR shall be basis for future analysis and audit of wild elephant deaths in the state. The format of MIR is appended as Annexure IX.

3.4 Stage IV: Filing of Periodical Death Audit Report (PDAR)

The management intervention reports (MIRs) and the progress of its field implementation shall be reviewed by a committee on quarterly basis, in each Tiger Reserve and Territorial Circle for filing of the Periodical Death Audit Reports (PDAR). The objective of conducting PDAR would be to:

- i. Review if the recommendations in MIRs have been implemented in the field or not and the outcome of implementation of the recommendations.
- ii. Examine the trend of death of elephants (in accordance with the categories listed in Annexure III) in the wild and propose long term remedial measures for prevention of unnatural deaths of elephants.
- iii. The committee shall review the budgetary support for carrying out post-mortem exercises and strengthening the veterinary units and make necessary recommendations for meeting resource gaps.
- iv. Submit consolidated report of the findings to the Chief Wildlife Warden for further action at the level of Government.

The Committee shall meet once in 3 months, during the months of January, April, July and October. The composition of the Committee will be as follows:

Sl. No	Members	Designation
1	Conservator of Forests/ Field Director of Tiger Reserve	Chairman
2	District Forest Officers/ Wildlife Wardens/ Deputy Directors in the Circle	Members
3	Departmental Veterinarian(s)	Member
4	A representative from the Dept. of Animal Husbandry	Member
5	Two representatives from NGOs active in the field of elephant conservation	Member

The format for filing PDAR is given in Annexure X.



4. Transparency and Accountability

The purpose of Death audit Framework is to maintain transparency and ensure accountability during the entire exercise. All the elephant death incidents and their preliminary observations shall be placed in the public domain at the earliest. The Periodical Death Audit Report (PDAR) shall be placed in the public domain on quarterly basis for the purpose of maintaining transparency.

5. General provision

- i. The Chief Wildlife Warden shall arrange a comprehensive training and capacity building programme for all concerned staff regarding Elephant Death Audit Programme.
- ii. The Chief Wildlife Warden shall develop an online platform for collection of data at once. The Elephant Death Audit Programme shall be completely digitized
- iii. Any proposal for modification or improvement of the Elephant Death Audit Framework can be proposed by the Field Director or Circle-in-charge officer to the Chief Wildlife Warden along with the Periodical Death Audit Reports.
- iv. The quarterly Periodical Death Audit Report (PDAR) shall be submitted by the Chief Wildlife Warden to the Government for their review.

6. Conclusion

Presently, identifying the cause of mortality in the field, remains a critical foundation for many questions related to population and conservation ecology of elephants. This framework will greatly improve transparency, assist all stake holders in assessing the results, and ultimately facilitate standardization and more credible comparisons of cause of mortality. This framework will also be helpful to collect mortality assessment data with high quality and credibility through a transparent process. The Framework and procedural steps herein could assist wildlife managers and ecologists to ensure accountability



ANNEXURES



Annexure I - Details of Elephant

(To be filled by Forest Range Officer concerned)

1	Sex	
2	Age	
3	Weight	
4	Body Measurements	
	a. Heart Girth	
	b. Height at withers	
	c. Length from point of shoulder to pin bone	
	d. Pad circumference (Foreleg)	
	e. Pad circumference (hind leg)	
5	Tusk/ Tushes measurements (length in cm)	
	Right	
	Left	
6	Range	
7	Division	
8	Habitat type	
9	Ambient temperature	
10	Date and Time of detection	
11	Photographs	
12	Videographs	

Date : _____ Signature : _____
 Place: _____ Name of the Officer : _____
 Designation : _____

Annexure II - Elephant post-mortem tool kit

The performance of a necropsy of an elephant is a major undertaking which is physically demanding and should never be underestimated in regard to its complexity. Where possible, an individual should not attempt an elephant post-mortem alone, without the necessary assistants and robust equipment. The following equipment is recommended:

a. The Instruments most commonly required are:

1. At least 6 quality large necropsy knives and a knife sharpener
2. Axe (small and big)
3. Handsaws
4. Chain saw and hacksaw / Power Saw
5. Bone cutter
6. Crowbar
7. Hammer and chisels
8. Scalpel handles
9. Scalpel blades
10. Surgical scissors
11. Forceps
12. Chisel
13. Bill Hook
14. Iron spatula
15. Heavy Ropes
16. Magnifying glass
17. Torches (Flashlight)
18. Camera
19. Vehicle fitted with light focusing facilities.
20. Metal detector (to search bullets)
21. Robert's hook – 2 Nos.
22. Tape measure
23. A kit may be packed in a stout, heavy, wooden box

b. Post-mortem equipment

The minimum requirements for conducting a safe and satisfactory field post-mortem examination are as follows:

1. A straight, pointed knife for dissection
2. A pair of 25 cm rat-toothed forceps
3. A pair of 15 cm pointed forceps
4. A pair of 15 cm dissecting scissors
5. A curved knife for skinning
6. A sterile scalpel and blades
7. An enterotome
8. A bone saw
9. A large pair of bone forceps or bone-cutting shears
10. An axe
11. Spirit Lamp
12. A sharpening stone and steel
13. A spring balance to weigh to 100 kg
14. A weighing balance to weigh to 10 Kg
15. A manual winch / block and tackle – some nylon rope
16. A small gas or alcohol burner for sterilising instruments
17. Instrument Box

c. Specimen containers and sampling equipment

The following list of equipment is necessary for sampling:

1. Sterile disposable 5 ml syringes and sterile needles (20 g)
2. Culture tubes with sterile swabs
3. Microscope slides in box
4. Sterile Universal bottles
5. Sterile blood tubes
6. Plastic bags with closure tops (Whirl pack or Ziploc type)
7. Heavy duty plastic sealing tape
8. 300 ml wide mouthed glass or plastic jars
9. A measuring tape or ruler
10. Rubber or plastic gloves (and talc)
11. Aluminium foil
12. A rabies kit (World Health Organization) (or drinking straw in a small jar of buffered glycerine)
13. Labels, string, waterproof marker pen/pencil

d. Transport equipment

For transportation, the following equipment is required:

1. An insulated, plastic cooler box
2. A leak-proof, screw cap, plastic containers
3. Absorptive packing material
4. String and heavy-duty plastic sealing tape
5. Sterile buffered 50% glycerine

e. Fixatives:

The following fixatives are used:

1. 10% buffered formalin (histopathology)
2. 100% acetone for cytology
3. 70% alcohol for parasites –

f. Disinfection materials include the following:

1. A plastic bucket and brush
2. A nailbrush, soap and towel
3. Borax
4. 5% formalin
5. Sodium hypochlorite (0.5%)
6. 70% ethyl alcohol for disinfecting instruments
7. Sodium carbonate (5%)

g. Additional equipment

The equipment listed below will also be very useful:

1. Field microscope (with mirror or car battery attachment for light source) for checking suspected anthrax cases before post mortem
2. A portable centrifuge for serum separation
3. A high resolution digital camera preferably with macro option
4. Digital Notebooks / PDA for recordings.
5. Magnifying Lens
6. PPE Kits – 10 Kits
7. Double ended probe
8. Telescopic ladder
9. GPS Instrument
10. Approved Artificial Light Lamp

h. Personnel Safety - Protective clothing

A list of protective clothing is given below:

1. Rubber boots
2. Rubber or plastic gloves
3. Rubber apron
4. Overalls (boilable)
5. Surgical masks approved for Tuberculosis exposure including goggles to cover eyes.

Annexure III - Category of Death

Sl. No	Category	Members	Select
1	Category A	Anticipated death: <i>Due to terminal illness, starvation and old age</i>	
2	Category B	Not unexpected death which occurs despite adopting good management practices <i>Due to diseases like Anthrax, Foot and Mouth Disease, Endotheliotropic herpes virus, haemorrhagic septicaemia, endoparasites, predation etc.,</i>	
3	Category C	Unexpected death which could not be preventable <i>Due to lightning, accidental fall from the cliff, infighting, dystocia, drowning etc.,</i>	
4	Category D	Unexpected death which could be preventable <i>Due to falling in the open well, electrocution by sagging power lines, colic due to feeding in landfills/ garbage dumps etc.</i>	
5	Category E	Unintentional Human-elephant conflict deaths which could be preventable <i>Due to rail accidents, road accidents etc.</i>	
6	Category F	Intentional Human-elephant conflict <i>Due to poisoning, illegal hunting, electrocution, burn injuries, gunshot injuries, trap/ snare wounds, bait bombs etc.</i>	



Annexure IV - Site Inspection Report (SIR)

(To be filled by Officer in charge of field team deputed for conducting Post-mortem)

1	Sex	
2	Age	
3	Height (in cm) and Weight (in kgs)	
4	Date and time of detection	
5	Location details (Division, Range & Beat, if carcass found inside forest) with GPS co-ordinates	
6	Location details (District, Taluk & village/town, if carcass found outside forest) including details of the nearest RF/wildlife area) with geo co-ordinates	
7	Habitat type (in case of forest area)	
8	Ambient temperature	
9	Details of external examination of the carcass including external injury marks, bleeding, etc if any	
10	General situation of the area around the carcass and signs of struggle, etc	
11	Relevant observations near the water bodies, if any	
12	Any other relevant details	
13	Details of the staff filing the report	

Date : _____ Signature : _____
Place: _____ Name of the Officer : _____
Designation : _____

Annexure V - Check List for Investigation before Post-mortem

(To be filled by Officer in charge of field team deputed for conducting Post-mortem)

1	Whether flash report of death is sent to concerned authorities within 24 hours after detection of death?	
2	Whether the death scene area was secured after detection of carcass? (10 m to 50m radius)	
3	Whether death scene search was conducted? (Minimum 500m radius)	
4	Whether death scene area was mapped and documented?	
5	Whether physical evidence from the death scene is collected?	
6	Whether the chain of custody of evidence collected was maintained?	

Date : Signature :

Place : Name of the Officer :

Designation :

Annexure VI - Standard Operating Procedure for dealing with Captive and wild elephant mortalities due to Anthrax and Suspected Cases of Anthrax

1. Reference

In response to sporadic deaths of wild elephants, reportedly due to anthrax and the ubiquitous threat that it poses to elephants and other wildlife populations, an expert committee was constituted vide F. No. 2-4/2012 –PE dated 21/08/17 to suggest ways to deal with anthrax and EEHV (Elephant endotheliotropic herpes virus) cases pertaining to elephants.

2. Purpose of this SOP

The main objective behind preparation of this SOP is to ensure that the carcasses of elephants suspected/diagnosed with anthrax are disposed off in a scientific as well as transparent manner to prevent any spread of anthrax to other wildlife populations.

3. Short summary

This Standard Operating Procedure (SOP) attempts to provide minimum steps, which need to be undertaken at the field level (reserve forest, Protected Area, revenue land, tiger reserve, elephant reserve or elsewhere) for disposing of elephant carcasses suspected to be affected by anthrax.

4. Scope of the SOP

The SOP shall be useful to the field staff of the Forest Department in elephant range Forest Divisions and other areas elephants are likely to be affected by anthrax/suspected anthrax.

5. Authorities responsible for implementation of SOP

The overall responsibility at the State level would rest with the Chief Wildlife Warden of the concerned state.

- i. In the case of Tiger Reserves, the Field Director would be responsible in the case of a tiger reserve.
- ii. For a Protected Area, (National Park/Wildlife Sanctuary), the concerned Protected Area manager would be responsible.
- iii. In case of other areas revenue land/conservation revenue/community reserve/ township) the Wildlife Warden, as per the Wild Life (Protection) Act, 1972, or Divisional Forest Officer/Deputy Conservator of Forests (under whose jurisdiction the area falls), would be responsible.

6. Line of action required in dealing with cases of suspected anthrax in elephants

- i. **Constitution of a team to oversee assessment and disposal of elephant carcasses diagnosed / suspected to be affected by anthrax**
 - a. Protected Area manager in case of National Parks and Wildlife Sanctuaries. The Field Director in a Tiger Reserve/DCF in whose jurisdiction the area falls.
 - b. A nominee of the Chief Wildlife Warden of the state
 - c. A representative of the NTCA if the incident pertains to a Tiger Reserve
 - d. A representative from the local Non-Governmental organization
 - e. Veterinarian of the Tiger Reserve/Protected Area, if any
 - f. District Veterinary Officer (DVO) or his representative, who should necessarily be a veterinarian from Animal Husbandry Department. A person from a teaching institute may be co-opted if required.
 - g. A representative of the local Panchayati Raj Institution
- ii. **Assess if the elephant is suspected to have died due to anthrax by carefully examining the following external signs:**
 - a. Bleeding from natural orifices (ears, mouth, eyes, genitalia, rectum, trunk) wherein blood is dark, tarry coloured and does not clot
 - b. Absence of rigor mortis or incomplete rigor mortis
 - c. Saw horse posture of carcass
 - d. Excessive bloating of carcass
 - e. Rapid decomposition/ putrefication of carcass
 - f. Subcutaneous swelling/edema in cases of acute/chronic case of anthrax

It may be noted that the aforesaid signs may be detected / externally noted in the case of other diseases and conditions as well. Therefore, as a general precaution, carcasses should not be opened up if any of the external signs discussed above are observed. Decision of opening the carcass at the field level shall be taken by the DVO or his representative. Their decision would be deemed final.

iii. Preventive Protected Equipment (PPE):

- a. The personnel handling the carcass should wear appropriate PPE to safeguard themselves, as anthrax is a zoonotic disease

iv. Steps for collecting biological samples:

- a. Blood samples should be collected from the veins of ear pinnae by a personnel properly wearing PPE
- b. Preparation of smear using the aforesaid collected blood sample for new methylene blue staining.
- c. Samples from natural orifices should also be collected.

v. Disposal of carcasses suspected to have died due to anthrax:

- a. Carcass in all Anthrax/suspected Anthrax cases should be burnt completely and under no circumstance be buried
- b. Prior to burning, spray the carcass with 10% formalin solution
- c. Area up to a radius of 50 metres around the carcass should be sanitized using a flame gun
- d. Further, an area up to 50 metres around the carcass should be fenced off using appropriate material for a period of 6 months
- e. Disinfect and guard off the water holes in which carcass was located to prevent disease spread to other wildlife.
- f. No parts like tusk/tushes from carcass should be collected or preserved as it could also a source of infection to human as well.
- g. To prevent damage and rupture of carcasses due to dragging or lifting by the machineries and escape of vegetative spores, carcasses should be burned at site of death to minimize the contamination.
- h. Used equipment and contaminated inanimate object like boots, slippers and clothes of handlers should also be sanitized with 10 % formalin.
- i. The area where carcass is disposed should be abundantly dusted/mixed with lime powder which will help prevent earthworms penetrating and bringing out the underneath soil.

7. Capacity building of staff and veterinarians is required in the following aspects

- i. Recognition of anthrax signs during post-mortems. In this context, photographic reference material should be provided to all frontline personnel
- ii. Carcass disposal methods
- iii. Preventive actions to be taken consequent to carcass disposal

8. Mapping spatial distribution of anthrax zones

It is advised to prepare a histogram of anthrax-related deaths using retrospective data overtime to forest disease occurrence. In addition, spatial distribution should be plotted to identify “anthrax zones” in the given area.

9. Continuous monitoring

- i. Field staff should perambulate their area and report any elephant death immediately. Staff should report the death of other species as well, which show symptoms that are similar to anthrax.
- ii. Revisit the Anthrax carcass site after 6 months for soil testing.
- iii. Based on the spatio – temporal dynamics of the disease, soil testing should be done yearly.
- iv. In case soil samples test positive, sensitize the area in a 50m radius using 10% formalin followed by flaming.
- v. Advise the district livestock department to carry out ring vaccination programme to the livestock in the fringe areas of sanctuaries to safeguard the livestock as well as to reduce spillover of infection if affected animal die in the sanctuary limit.

10. Videography of elephant necropsy

It is advised that the entire post mortem process and elephant carcass disposal be video- graphed and supplemented with still photographs

11. Suggested test for confirmation

- i. Culture of blood (collected from vein as well as from natural orifices), which is to be collected in whole blood collection tube over cold chain
- ii. Polymerase Chain Reaction using blood. Blood to be collected in EDTA and transported over cold chain.

Annexure VII - Age and growth parameters in Asian elephants

Age (years)	Height (cm)		Weight (kg)		Tusk Circ. (cm)
	Male	Female	Male	Female	
	90	89	120	120	—
1	121	119	330	310	—
2	139	135	520	470	—
3	155	149	705	610	7.6
4	169	161	920	710	9.8
5	180	170	1,130	810	11.9
6	190	177	1,340	930	13.8
7	198	183	1,540	1,055	15.7
8	205	188	1,730	1,180	17.4
9	212	193	1,900	1,300	19.0
10	217	197	2,065	1,415	20.5
11	222	200	2,200	1,525	21.9
12	225	203	2,320	1,635	23.3
13	228	206	2,400	1,735	24.5
14	231	209	2,500	1,830	25.7
15	235	213	2,645	1,925	26.8
20	250	228	2,970	2,300	31.3
25	262	234	3,400	2,560	34.6
30	268	238	3,650	2,740	37.0
40	272	240	3,800	2,930	40.0
40+	274	240	3,900	3,000	43.4

Note: The height is twice the circumference of front foot for all ages.
The circumference of tusk is measured at gum point

Source: Sukumar, R. (1989). *The Asian Elephant Ecology and Management*. Cambridge University Press.

Annexure VIII - Part A - Post-mortem Interim Report (PIR)

(To be filled by Veterinarian)

1	Sex	
2	Age	
3	Height (in cm) and Weight (in kgs)	
4	Location with geo coordinate details	
5	Details of the request letter for conducting the post-mortem	
6	Date and time of conducting post-mortem	
7	If death was due to electrocution, was necessary certificate issued by TANGEDCO?	
8	Whether a case of suspected Anthrax	
9	If yes, details of action taken for lab confirmation and carcass disposal	
	If no, whether carcass was found in a state of conducting a fruitful post-mortem	
10	Details of external examination of the carcass including external injury marks, bleeding, state of putrefaction, scavenging, etc as routinely followed in post-mortem	
11	Details of internal examination of the carcass, general condition of the visceral organs, etc	
12	Details of samples set for laboratory analysis including date of referral	
13	Measurement details of tusks/tushes	
14	Provisional cause of death	
15	Whether any wildlife offence booked? If yes, offence details in brief	
16	Any other relevant details	
17	Details of the veterinarian conducting the post-mortem	

Date : Signature :

Place : Name of the Officer :

Designation :

Part B - Format for Post-mortem Report

(To be filled by Veterinarian)

1	Date and time of post-mortem	
2	Details of the officers/ Organization/ local body representatives/ field staff present during post-mortem	
3	Cause of death (Provisional Diagnosis)	
4	Co-morbidity (if yes, details)	
5	Details of samples collected for laboratory analysis	
6	Are samples collected adequate for laboratory tests as per accepted standards?	
7	Whether carcass is disposed as per accepted standards?	
8	Details of laboratory investigation results	
9	Whether the chain of custody of samples collected for laboratory tests is secure?	
10	Primary cause of death (Final Diagnosis)	

Date : Signature :

Place : Name of the Officer :

Designation :

Annexure IX- Form for Management Intervention Report (MIR)

This format, in addition to the details available in PIR, shall include the following additional details:

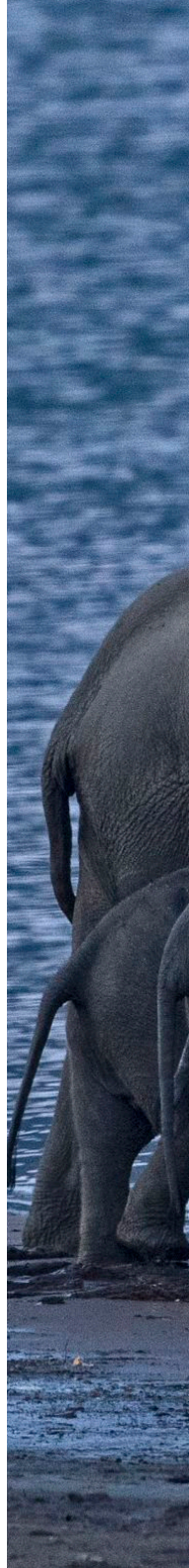
1	Laboratory results including date of receipt of results	
2	Cause of death as per lab results	
3	Details of remedial measures proposed for preventing unnatural deaths	
4	Any other relevant recommendations	



Annexure X: Format for filing Periodical Death Audit Reports (PDAR)

1	Date of conducting PDAR	
2	Details of implementation of preventive/remedial measures	
3	Details of outcome of such actions	
4	General trend in reduction or otherwise of death of elephants since implementation of the remedial measures	
5	Any other relevant information	

As the different sections of the report may be voluminous, PDAR can be submitted in a running report form by presenting the required information under different sections and headings.







References

1. Government of India, (2002). *Techniques and Procedure for Post-mortem of elephants*, Project elephant and Central Zoo Authority, Ministry of Environment, Forest and Climate Change, New Delhi.
2. Hile, E.M., Hintz, H.F. and Hollis, N., (1997). *Predicting body weight from body measurements in Asian elephants (Elephas maximus)*. *Journal of Zoo and Wildlife Medicine*, 28(4):424-427.
3. Wildlife Crime Control Bureau, (2013). *Wildlife Crime Investigation, A Handbook for Wildlife Crime Investigation Officers*. Ministry of Environment, Forests and Climate Change, Government of India, New Delhi.
4. Cooper, J.E and Cooper, M. E, (2013). *Wildlife Forensic Investigation, Principles and Practice*. CRC Press, Boca Raton.
5. Government of India. *Maternal Death Review, Guidebook*. Ministry of Health and Family Welfare, New Delhi.
6. Government of Western Australia, *Review of Death Guideline v1.2*. Department of Health.
7. Government of India. *Guidelines for collection, storage and transportation of Crime Scene Biological samples, For Investigating Officers*. Central Forensic Science Laboratory Directorate of Forensic Sciences Services, Ministry of Home Affairs, Govt. Of India Dakshin Marg, Sector 36-A, Chandigarh.





TAMIL NADU FOREST DEPARTMENT

