

# ELEPHANT HAND COOK BOOK

Prajna CHOWTA



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हाथी परियोजना  
भारत सरकार



PROJECT ELEPHANT  
GOVT. OF INDIA



**ANCF**

ASIAN NATURE CONSERVATION FOUNDATION

# ELEPHANT CODE BOOK

Prajna Chowta

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भारत सरकार  
पर्यावरण एवं वन मंत्रालय  
GOVERNMENT OF INDIA  
MINISTRY OF ENVIRONMENT & FORESTS

## FOREWORD

In the long history of elephants in captivity in India there have been several treatises on the care and management of the species. In the modern day a number of captive elephant ‘manuals’ have been produced and some more are currently under production. Where the **Elephant Code Book** by Prajna Chowta differs from most of the earlier works is the handy nature of volume as well as the succinct and focused way in which it presents a large amount of information that draws upon the personal practical experience of the author and a supporting team of renowned experts. All the management information presented is put into a historical context that explains in a simple and lucid style the justifications that underpin the judgments and recommendations in the book. The **Elephant Code Book** enunciates a simple yet comprehensive set of standards for the management of captive elephants that incorporates the best information from both India’s traditional methods and approaches to elephant care as well as those derived from modern, scientific, humane elephant management systems.

The **Elephant Code Book**’s underlying philosophy for evolving standards for captive elephant management rests on the uncompromising belief that elephants in captivity must be kept and managed under conditions that most closely replicate the conditions that elephants would experience in the wild. Hence, the four seminal questions that run throughout the guidance that the book articulates are:

- Is the location where the elephant is kept equivalent to its natural habitat in terms of climate, temperature, vegetation and water?
- Is the elephant free to search and select its own food?



- Is the elephant free to interact with, or avoid, other elephants?
- Are the conditions met for the elephants to breed naturally?

The actual condition of the 3000–4000 captive elephants in India dispersed among forest camps, zoos, temples, circuses and private owners throughout the country have not been systematically assessed. The extensive scientific survey of captive elephants in the major elephant bearing states of India conducted between 2005 and 2008 by two civil society groups, the Asian Nature Conservation Foundation (ANCF) and Compassion Unlimited Plus Action (CUPA), supported by Project Elephant (Government of India), highlighted through quantitative indicators the extent to which various facets of the management and healthcare conditions of captive elephants in India depart from ideal management conditions. The **Elephant Code Book** systematically and comprehensively addresses these shortfalls in captive elephant management in India. In an eminently readable and easily comprehensible style it lays out remedies, some that can be implemented immediately and others that involve more long-term behavioural changes within society as well as changes necessary in policies and laws.

A. N. Prasad  
IGF & Director (Project Elephant)



जहाँ है हरियाली /  
वहाँ है खुशहाली !!

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The idea of this book was first suggested by Surendra Varma, a field biologist at ANCF, who is passionately dedicated to the Asian elephant with a vast experience of research all over India, Myanmar and Vietnam. Varma managed to convince me that my experience with elephants and mahouts should be shared with others and he provided me with a mass of scientific references. Having myself come to elephant conservation via the indirect route of anthropology that led me to the study of tribal communities of mahouts and subsequently to the elephants themselves, I objected that I would not print anything that would not sustain the criticism of two eminent experts on the Asian elephant, both of whom I regard very highly:

— S. S. Bist, a high-profile Indian Forest Service officer who held the prestigious positions of Field Director of Buxa Tiger Reserve in West Bengal, Inspector General of Forests and Director of Project Elephant (Government of India), Principal Chief Conservator of Forests (Wildlife) and Chief Wildlife Warden (Government of West Bengal). A long-time supporter of the Indian tradition of taming elephants, S. S. Bist revived the 1920s' pioneering work by the legendary A. J. W. Milroy in his book *Management of Elephants in Captivity* (2002).

— Dr. Raman Sukumar, a leading scientist in the biology and ecology of the Asian elephant—author of three major books including the groundbreaking *The Asian Elephant, Ecology and Management* (1989) and numerous scholarly publications—who has introduced objective science-based policies into wildlife conservation and management. The recipient of various international awards and recognitions and a member of several national advisory bodies, Dr. Sukumar is presently Professor and Chair of the Centre for Ecological Sciences at the Indian Institute of Science and the founding trustee of the Asian Nature Conservation Foundation (ANCF).

Miraculously, both S.S. Bist and Dr. Sukumar welcomed my first draft and patiently revised it. However, I also had to subject my experience in the health care of

elephants to the scrutiny of a veterinary doctor and could not decide upon anyone else than Dr. B. C. Chittiappa, who has always generously shared his knowledge over the years. Deputed from the Animal Husbandry Department to the Karnataka Forest Department from 1985 to 2003, Dr. Chittiappa has treated the Department elephants and captured over one hundred problematic elephants. He is presently the veterinary officer at Bannerghatta Biological Park.

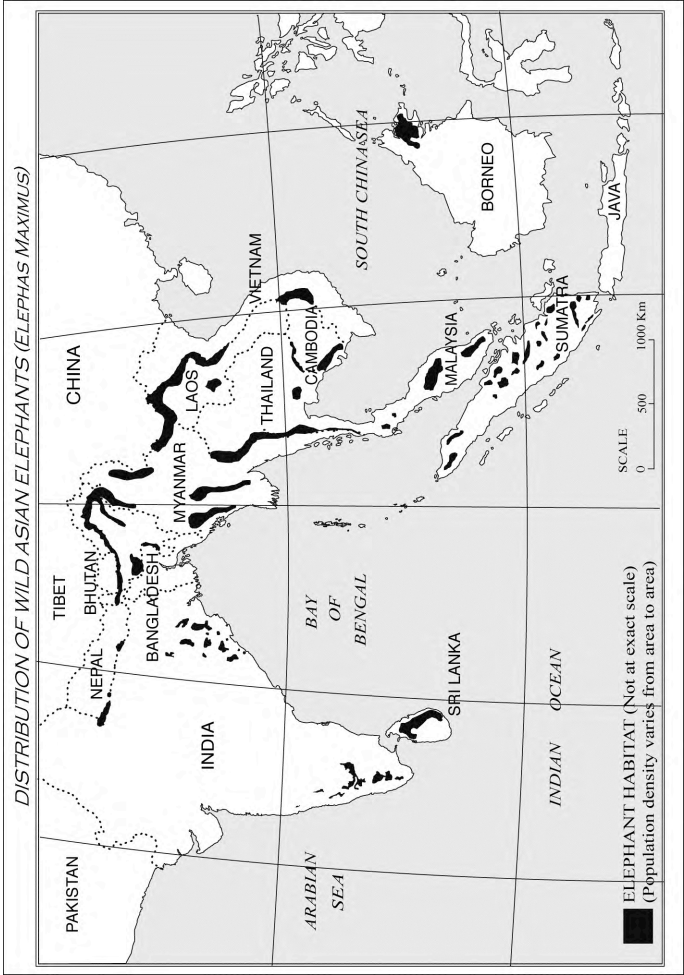
Philippe Gautier, my husband and director of five films on the Asian elephant, helped me with the editing and layout of this book, while Dr. Amrita Karnik and Arun Narayanan spontaneously accepted to proofread the text. Thomas Mathew, Executive Director, ANCF, patiently followed through the publishing of this book with the assistance of his colleague Sanjay Rattan.

I cannot miss the opportunity to reiterate here my gratitude to S. Parameswarappa, an IFS officer with an MSc in Natural Resources Management from Berkeley University. Among his teachers at the Forest Institute in Dehra Dun, he had the legendary pioneer of wildlife conservation, P. D. Stracey. S. Parameswarappa began his career during the last *khedda* days and occupied the position of Principal Chief Conservator of Forests of the Karnataka Forest Department from 1990 to 1995. Without his help and advice, it would not have been possible for me to enter the portals of the Forest Department and spend extensive amounts of time in the field among mahouts and elephants. Upon retirement, S. Parameswarappa agreed to become the president of the Aane Mane Foundation and joined M.P. Prakash, Dr. K.M. Kaveriappa and D.K. Chowta in supporting my endeavours.

Finally, I wish to pay tribute to Parbati Barua, whom I visited in 1993, just after finishing my studies in London. She showed me a rare copy of the *Hastividyarnava* and was the living proof that all this was possible for a woman.

Prajna Chowta  
January 2010

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## 1. Introduction

**Situation of the species.** It is well known that the Asian elephant is at first a wild and formidable animal that lives freely in forest areas where it has no predator except man. But few people know that today, only about 40,000 elephants remain in Asia, including 28,000 in India (compared to about 500,000 in Africa). At the dawn of human civilisation, Asian elephants lived in a vast territory stretching from the Tigris and Euphrates Valleys in present day Syria and Iraq to the Yangtze-Kiang river in China (Daniel, 1998), and from the foothills of the Himalaya to the south of the Indian subcontinent and South-East Asia. They had also occupied the islands of Sri Lanka, Sumatra and Borneo that were accessible from the mainland as late as the last Ice Age, 18,000 years ago. This early range of 9 million km<sup>2</sup> has shrunk to less than 500,000 km<sup>2</sup> (Sukumar, 2003). Today, elephants are confined to small populations that cannot interact with each other anymore (see Distribution Map). This is why international experts have declared the Asian elephant (known to scientists as *Elephas maximus*) a highly endangered species and states have enacted laws for its protection.

There is no doubt that the decrease in the elephant population in the course of history is due to the occupation of land by humans and the killing and capture of millions of elephants. This fascinating animal, the result of more than 50 million years of natural evolution, a keystone of the ecological system, may disappear forever within a few decades if not protected. Its survival is in our hands, and its protection remains a challenge for humanity.

**Elephants in captivity.** It is also well known that the Asian elephant can be tamed and its strength and intelligence used for the service of man. India has a long history of capturing and training wild elephants. Seals of the Indus Valley civilization (2500–1500 B.C.) suggest the use of tamed elephants in India at that time (Carrington, 1958), though the capture and taming of elephants has probably been practiced earlier in India. Between 2 and 4 million wild elephants have been captured since the beginning of elephant keeping and 30,000 to 50,000 were captured or killed between 1868 and 1980 (Sukumar, 1992, 1994).

Yet, very few people know that today, as many as 16,000 elephants are captive in Asia, and over 3300 in India alone. A 2008 estimate by the Government of India's Project Elephant gives the following figures:

Chart 1: Distribution of captive elephants in India

Geographical Distribution	Minimum	Maximum
South India	860	920
North East India	1903	1970
East India	209	240
North India	271	300
West India	79	92
Total	3322	3522

Highest Distribution	Minimum	Maximum
Assam	1253	1290
Kerala	612	635
Arunachal Pradesh	564	580

Agency Wise Distribution	Estimate
Forest Department	500
Zoos	82
Circuses	92
Private Owners and Temples	2650–2700

Source: Project Elephant, 2008

In India, the sight of elephants in inhabited areas is so common that many people think of them as a separate breed of 'domestic elephants'. This is a deep misconception. By 'domestic', one usually refers to animal species that have been biologically modified by selective breeding over centuries by the agency of man and are now distinct from the wild species from which they originated (e.g. cats, dogs, horses, cows, sheep, pigs, goats, chicken, etc.). This does not apply to the elephants that can be seen in forest camps, zoos, temples, tourist spots, circuses and plantations or wandering in city lanes. In fact, it is more accurate to speak of 'captive' or 'tamed' elephants or more accurately of 'elephants in captivity', as most of them have been captured from the wild, and there is no biological difference between a wild and a captive elephant. The vast number of elephants in captivity is a cause of concern as they do not breed well and cannot maintain a population of their own, independently from the wild population. As much as man tried to breed elephants in ancient and modern times, it never worked well (see Zoos). Consequently, more and more elephants were captured from the wild until a few pioneers in wildlife conservation realised in the 1960s that the species was in danger of extinction (see *Elephant Gold*, by P. D. Stracey, 1963). Even in captivity, elephants remain a wild species. It is obvious that for them, captivity represents an immense compromise to living freely in the forest, and it does not take an expert eye to realise that the living and health conditions of many captive elephants are not viable.

**Tradition.** The custom of taming and keeping elephants in captivity has been practised in India for at least 4000 years. Elephants have been used in



large numbers in wars, parades, religious ceremonies, for game hunting and the exploitation of timber. In times when elephants were widely used and represented great economic value, the methods of keeping and handling captive elephants were part of common knowledge in Indian society. Treatises on the upkeep and health care of elephants have been written in Sanskrit, Tamil, Assamese, Urdu, English and other languages, using the scientific knowledge that was available at the time. However, the use of elephants has decreased tremendously today and the transmission of this knowledge is being progressively lost (see chapter on Mahouts). While in the past, this expertise was transmitted from generation to generation within communities of mahouts, today many elephants are left to the care of men who work based on practises quickly acquired on the job, without any proper training. In consequence, it often leads to mishandling. There is no doubt that this tradition needs to be reassessed and updated today.

**Economic factors.** The condition of captive elephants always depends cruelly on economic factors. At any time in history, the cost of purchase and maintenance of an elephant was always high and therefore, the quality of the upkeep was always a compromise between the expenses caused by the elephant (and its mahouts) and the income it could generate. When thousands of elephants were maintained at great expense by kings, in ancient armies, battles had to be won whatever the extent of casualties. In the time of timber extraction, each elephant had to drag its daily quota of timber so as to produce the maximum income for the company. Today, temple elephants are expected to ‘bless’ the largest number of devotees and receive the

maximum of offerings, the same way as in tourist spots, it is made to carry as many visitors as possible and in circuses, it is expected to learn a number of tricks and perform in the maximum of shows to justify the expenses of its ration and the salary of its keepers. In all these cases, the living conditions of an elephant always comes second to its capacity to produce an income for its owner.

With captivity, the elephant has not only lost its freedom, it has also been caught in the economic system that rules human society, often beyond the dedication of the owners or the mahouts. This results in situations where elephants live under conditions that are inadequate to assure their basic health and survival. In some cases, captive elephants endure harsh treatment by inexperienced mahouts, or suffer from injuries, infections, insufficient or inadequate nutrition, unclean or inappropriate living areas, isolation, overwork, stress, lack of veterinary care, accidents with motor vehicles, etc.

A survey of captive elephants and mahouts in various states of India, conducted between 2005 and 2008 (ANCF, CUPA, WSPA et al.) was pivotal in defining clear parameters for the welfare of elephants in captivity (Varma & Prasad, 2008). It revealed that the living conditions of many captive elephants are unsuitable and that the knowledge of a vast majority of mahouts is insufficient to cope with these problems. Today, when the notions of animal welfare and wildlife conservation are gaining ground in modern society, the condition of many captive elephants raises new concerns. Now that modern society, industries and armies do not need elephants, it is evident that they should not be used and abused anymore. After helping man for thousands of years, the elephant should be helped in its turn to live and prosper where it belongs.

**The aim of this book** is to provide in one handy volume the essential facts and information on the management of elephants in captivity, with the historical background that is necessary to understand the present situation. It also attempts to set minimum standards in the hope that the principles and methods articulated here will be adopted as a code of conduct in the management of captive elephants. Finally, it is motivated by the conviction that captive elephants should play a greater role in the conservation of the species as a whole.

This text is the result of 16 years spent in various elephant camps and amongst communities of mahouts in distant parts of India to study the methods of keeping and handling elephants, absorb the culture that has developed from this ancient tradition, and forge a personal experience of contact with elephants. It reviews the classical texts on the subject, most of which are out of print today, and refers to numerous scientific reports and publications that have considerably deepened our understanding of the elephant in recent years. Moreover, this text was submitted to the scrutiny of several reputed specialists of the Asian elephant who kindly accepted to revise it.

The Elephant Code Book is designed as a reference tool for Forest Department officers, wildlife activists, private elephants owners, temple trustees, circus managers, zoo directors, veterinary doctors, traditional mahouts, elephant keepers and all those who can make a difference in the lives of captive elephants.

## 2. Where to keep an elephant?

In the wild, Asian elephants live in tropical deciduous forests that provide ideal conditions for the well-being of the species: space, climate, vegetation, water and social interactions. These conditions have in fact allowed and determined the evolution and the survival of the species over millions of years. One should therefore always attempt to provide captive elephants with conditions as close as possible to their natural habitat.

The behaviour of an elephant is partly instinctive and partly the result of a learning process that takes place during social interactions. Feeding habits and sexual behaviours, for instance, are largely acquired from an early age by imitating the behaviour of older elephants. Likewise, young males progressively engage other males in playful fights and learn the limits of their strength and the necessity to control their aggressiveness. Therefore, when an elephant is isolated—especially at a young age—and placed in captivity, it is deprived of this learning process and, consequently, its behaviour is deeply altered.

In the wild, the social behaviours of males and females are very different. Females, during their entire lives, remain in herds composed of related females and calves, led by a matriarch. Males leave the maternal herd when they attain sexual maturity, then remain solitary or congregate with other males and only join herds temporarily for reproduction. This should also be taken in account before placing several individuals in a common structure.

**Four simple questions** should be asked to decide whether the conditions of captivity of an elephant are consistent with the conservation of the species.

1. Is the location where the elephant is kept equivalent to its natural habitat in terms of climate, temperature, vegetation and water?
2. Is the elephant free to search and select its own food?
3. Is the elephant free to interact with—or avoid—other elephants?
4. Are the conditions met for the elephants to breed naturally?

These four questions should remain as permanent guidelines in any decision regarding the management of elephants in captivity, and first of all in the selection of a place to keep captive elephants.

**Shade.** Most wild elephants live in forest areas with altitudes between 500 and 1500 metres. The altitude and the shade under the forest canopy regulate the temperatures from a very minimum of 0°C in the early hours of the day in winter to a maximum of 25°C even in the hot afternoon hours in summer. Although elephants may withstand harsher weather conditions for a short period, it is important that the shelter of a captive elephant should offer moderate temperatures, good shade and proper ventilation. One characteristic of elephants is that they have very few sweat glands and due to their huge body mass, their body temperature rises quickly. Therefore, they need shade to protect themselves from the hot sun, and they should not work or walk long distances when the temperature is high. Shade should be provided by trees if any, or thatched roofs as an alternative. Roofs made of cement or tin heat up in the sun and do not provide a cool shade.

**Water.** Elephants also need large quantities of clean water to drink (about 150 litres per day for an adult) and to cool off. That is why it is preferable to keep

elephants near a river or a lake. Today, with the wide use of chemicals for industry and agriculture, the quality of water should be tested annually as it may contain a high level of pesticides or other pollutants rejected by factories, human habitations or running from agricultural fields by natural drainage during the rainy season. Small ponds should not be used because the accumulation of dung and urine in the water develops a high density of bacteria and microbes that may spread diseases among the elephants. Water is essential to elephants, much more than to a cow or a horse. Scientists have discovered that the 50 million-year-old proboscideans that share a common origin with the present elephants were semi-aquatic mammals living in lakes and rivers (Shoshani & Tassy, 1996). Elephants have inherited an attraction and a need for water, so they play in water or swim spontaneously.

**Soil.** The nature of the ground surface of an elephant enclosure is also very important. If kept on hard material like stone, asphalt or concrete, the sole and nails of the elephant wear out excessively and become prone to infection. Dry, clean earth (rubber is used in modern zoos) is the best ground for an elephant, and the animal should not be made to stand in its own dung, urine or humidity for risks of infection of its feet. One should also keep in mind that the elephant lies down to sleep in the middle of the night. So the ground must be dry, cleaned every day, sometimes disinfected by fire or with an antiseptic solution (e.g. potassium permanganate) and dung piles should be removed at once. A good layer of fresh hay or clean sand should be spread in night shelters every day.

**Space.** Wild elephants may easily cover more than twenty kilometres per day, and even hobbled elephants left to graze in the forest walk several kilometres every night. However, many captive elephants in zoos, circuses, temples and private *pilkhanas* are often found in small enclosures, or tied all night and a portion of the day in the same spot. The extent of space allotted to elephants in captivity is subject to debate (see chapter on Zoos). The norm of  $8 \times 6$  m prescribed as night-shelter for elephants in Indian zoos and circuses by the Central Zoo Authority, may appear to be adequate for this purpose. However, in the wild, elephants only sleep for 2–4 hours and spend the rest of the night in feeding, exercising and socializing. Therefore, the time spent in the shelter, usually fixed according to the working hours of the keepers or mahouts, is not appropriate for the natural behaviour of elephants. Moreover, captive elephants should be able to exercise sufficiently during the day, but are rarely given the opportunity to do so. Scientists have calculated that the average space used by an elephant in the wild is 125 acres (50 hectares) and suggest that in captivity, an elephant should be given an enclosure of at least 1% of this space, that is 1.25 acres or about  $5000 \text{ m}^2$  (Varman et al. 1995). Another study estimates that ‘free-ranging Forest Department elephants in Tamil Nadu and those in a Sri Lankan orphanage have access to  $100,000 \text{ m}^2$  (25 acres) of natural habitat during the night’ (Taylor & Poole, 1998). Therefore, one captive elephant may have to be provided at least  $20,000 \text{ m}^2$  (5 acres) of space to meet its requirements.

In circuses and temples, where fixed open areas cannot be provided, mahouts must take the elephants out for a walk in the open every day. Even a walk by elephant for collection of fodder is welcome. A

program of seasonal transfer of temple elephants to forest camps has been experimented within Tamil Nadu. This requires systematic veterinary check-ups in order to avoid transmissible diseases; however, it should be further considered, as it would give an opportunity for the elephants to recuperate from intensive conditions of captivity and to interact with other elephants.

**Calm.** One more point often neglected in the selection of a proper elephant shelter is that it should be peaceful. Elephants have a very sensitive hearing, therefore, motor vehicles, generators, loud speakers, human activity, etc. should be far away, especially at night, so that the elephant may be able to sleep and rest properly. Dogs and cattle should be prevented from coming into the camp or into the enclosure as they may disturb and spread disease among elephants.

**Methods of restraint.** Keeping an elephant in a specific area is a complex problem. Traditionally, camp elephants are let out to graze in the forest during the night, equipped with hobbles that reduce their pace and a drag chain that helps to track them in the morning (see Plate 1). This allows them to cover several kilometres every night, and hardly hinders their capacity to negotiate all types of terrain. Aane Mane Foundation has redesigned the traditional elephant hobbles by replacing the two inner rings by a length of 7 links of chain which still prevents the animal from charging but allows a longer pace. However, an innovative substitute for the chains would be an improvement in their condition.



Camp elephants should be tied only under exceptional circumstances (training, health care, risk of poaching), for a very short period and under close monitoring. Unless tied inside the camp and monitored day and night, captive elephants are completely helpless against attacks by wild males and should be untethered. Females are usually not threatened by wild elephants but rather courted, although some tuskers, especially sub-adult males, sometimes behave brutally.

Zoos usually place a moat or an electric fence around the outdoor enclosure, while the elephants are chained or caged during the night. The Central Zoo Authority of India has directed the zoos to use chains on elephants only sparingly, but this recommendation is frequently disregarded (see chapter on Zoos).

Temple, circus or private elephants are often chained permanently. Over a long period of time, chains cause bruises that become sources of infection. Therefore, chains should be removed daily and oil (usually *castor* oil) should be applied to the ankles. The chain should be tied alternatively to a different foot weekly and the elephant should be made to walk several kilometres every day.

Restricted or intensive conditions of captivity are likely to alter the behaviour of the animal and lead to complex problems of management.

**Elephants out of control.** All captive elephants (and mahouts) must have undergone a minimum period of training. However, it sometimes happens that a captive elephant becomes aggressive and impossible to handle. Such cases occur amongst temple, circus and private elephants but also in zoos (see Security in Zoos). A male elephant coming into *musth* is a natural, well-known and sometimes

predictable situation (see Musth). In other cases, it is the method of restraint and the inadequate conditions of captivity that alter the animal's behaviour over time. Chaining an elephant may seem to be a necessary precaution but is often the cause of the problem. When tied for long periods and therefore deprived of physical activity, the elephant cannot release its energy or stress. While walking and bathing would help to calm it down, untying a stressed elephant (or if it breaks its fetters) may have dire consequences. In such a stressed situation, when its movements are suddenly freed, the animal may become extremely aggressive. This causes managers and mahouts to be overwhelmed. Generally, the blame is put on the animal that is believed to have turned suddenly insane while in fact the conditions of captivity have been inadequate for a long time.

Crisis situations often have dramatic consequences for the life of the mahouts, for the public or for the elephant itself. In India, strong cultural values make people reluctant to put down the animal; there is an understanding that the elephant has been mishandled, the responsibility for which lies with its owner and mahouts.

In such cases, the safety of people should not be put at risk and the nearest Forest Department office should be immediately contacted for assistance along with the local veterinarian and even the police if the incident happens in a public place.

Tying an elephant should be considered only temporarily. If the animal is aggressive and has to be tied round the clock, it should be monitored daily by a veterinary doctor until it can be released and resume a normal routine that includes bathing and walking. A situation of crisis is the result of inadequate management over a long period of time and should lead the manager/owner, the mahouts

and the competent authorities to reconsider the methods and principle of keeping elephants in the concerned establishment.

### 3. Water and bath

**Hygiene and cooling.** The balance of body fluids is particularly important in the thermo-regulation of elephants as they have a heavy body mass and very few sweat glands. Although they partly fulfil their water requirement from the water content of plant tissues that they eat, elephants should be watered and bathed daily, in the morning, preferably in a river or stream with flowing water, before being given their first ration. In the dry, hot season, a second watering and a short bath should be given at the end of the afternoon. If the elephant is hot because it has been working or walking for long distances in the heat, he should be bathed after a gap of 1 hour as the body of the animal is overheated and it may catch a cold if immediately exposed to cold water. It is important to water elephants in a different place (upstream) from where they are washed, to ensure that the water they drink is not spoiled by dung, urine or parasitic diseases and other ailments that are water-borne.

When the elephant is taken to the river, it should be allowed to enter the water at its own pace. It often defecates and urinates just after entering the water. The dung should immediately be removed from the water and deposited on the bank, far from the water. If dung is accumulated regularly in one place, it should be burnt when it has become dry so as to avoid the propagation of parasites and microbes. Elephants that have diarrhoea should not be bathed but treated medically (see Basic health care).

A properly trained elephant should be allowed to enter the water with open hobbles. The drag chain should be removed as it may get caught in some roots or rocks underwater. The elephant should be allowed to play, immerse itself or swim in the river.

Most elephants are naturally good swimmers, but in no case should they be forced to do so. A strong current, rocks lying underwater, a steep riverbank or quicksand may be dangerous.

Mahouts are usually poor swimmers and do not allow the elephant to swim as they are afraid to lose control over the animal. If the mahout has a good relationship with his elephant, the animal will come back to the bank on its own when he has played or swum to its content. Of course, with freshly captured animals or tuskers in *musth*, precautions may be taken and the drag chain may be tied to a pole or a tree on the bank.

The mahout should select a sandy spot without stones in about two feet of water. He should then make the elephant to lie down by using verbal commands (*beit, téré*) and, if necessary, by pulling one ear with the hand (see Verbal Commands).

**Skin and brushes.** While bathing, the mahout should scrub the entire body of the elephant in order to remove dirt and ectoparasites in the skin folds, detect and clean small cuts, thorns or insect bites. This requires some precaution. In fact, the name 'pachyderm' often used for elephants (from Greek, *pakhus*, thick; *derma*, skin; i.e. thick-skinned) is largely undeserved and more appropriate for the rhinoceros or the hippopotamus. The thickness of elephants' skin varies greatly between different parts of the body but the skin is always very sensitive. This may be felt by touching the skin of the feet that is considerably thick with deep wrinkles, then the inner surfaces of the legs that are in contact with the chest or abdomen, where the skin is much thinner and very soft. Elephants also have a virtually hairless body, unprotected by fur, unlike horses and dogs. Therefore, plastic or metal brushes used for

furred animals are completely inappropriate and may be dangerous as their fibres are too sharp and may hurt the elephant. Manufactured brushes are not practical as the bristles bend and wear out quickly. In southern India, brushes for elephants are traditionally made from the thorny fruits of *Pandanus unipapillatus* (*Mundakai*, in Kannada), a wild plant that grows on riverbanks. The fruits of *Pandanus* are collected in March. The thorns are removed and the fruits cut, sun dried and stocked for the whole year. Some mahouts also use coconut husk, pumice stones or simply a handful of grass or hay. The important point is that the brush should not be sharp and should not hurt the skin of the animal, but it should be firm enough to stretch and clean the folds of skin. The mahout should have a good knowledge of these features to be able to scrub the elephant efficiently without hurting the animal; further, the skin should be well watered during the process.

**Scrubbing.** All parts of the elephant should be washed and scrubbed, especially at the base of the tail, the anus, the genital parts, the fold between the legs and the body where the skin is tender, the back of the ears, the folds of skin below the neck, the base of tusks and *tushes* up to the gum, the wrinkles around the eyes and on the trunk, and the toes and nails. The mahout should first make the elephant sit, lie on one side, then on the other side to access all parts of the body. The scrubbing time is the perfect opportunity to check the soles of the feet for thorns, embedded sharp stones and cracks that may lead to an infection. **The sole should be rough and with a texture known as *buttons*.** A completely soft sole indicates that the elephant is kept on hard ground such as stone or concrete, which should be changed.

Long nails show that the elephant is not given the opportunity to walk sufficiently. The elephant should then be made to stand in order to scrub the legs, the tail and the trunk. Verbal commands exist to enable the animal to stretch its legs, his trunk, immobilise its tail, etc. (see Verbal Commands). Finally, the mahout should rinse the entire body of the animal with clear water. A proper bath should last no less than one hour and both the mahout and *kawadi* should participate. No soap or detergent should be used. Adequate facilities for bathing should be arranged for all temple, circus, zoo and private elephants.

**Oiling.** When the elephant is perfectly clean, any cuts, insect bites and small injuries should be detected and treated immediately in the camp with antiseptic paste or *neem* oil. *Castor* oil should be rubbed on the animal's forehead (only in dry, hot weather), ankles, nails and the hair of the tail. *Neem* oil should be applied on the base of the tusks and lightly spread on the belly to repel flies and other insects. Minor wounds, if any, should be cleaned with a solution of potassium permanganate, then diluted iodine, followed by an application of *turmeric* powder, *neem* oil or antiseptic ointment (e.g. Himax. See Basic health care).

**Trust.** Bathing an elephant is one of the most important times to establish and maintain a bond between the elephant and its mahouts. This is the second important reason for bathing and scrubbing an elephant every day. In the wild, elephants hardly lie down, except for two to four hours past midnight when they sleep, sometimes resting in a quiet place during the day if they feel totally secure, or if they are seriously sick or dying. Otherwise, never will

one see an elephant lying on the ground. For a wild animal such as an elephant, even in captivity, lying on the ground is a position of vulnerability. Therefore, when the elephant consents to lie down in front of man, its sole predator, it is a tremendous demonstration of trust. In fact, some tuskers captured from the wild just sit in front of the mahout, however experienced the man may be, but never lies down even after many years of captivity. The relationship between man and elephant is at stake at this precise moment. This is why washing and bathing should be repeated every day. Normally, when the mahout finds his elephant in the forest in the morning, he commands the animal to lie down, then removes the mud the animal has spread on its back while grazing and repeats the same exercise while bathing. This exercise resets the relationship between mahout and elephant. An elephant that refuses to lie down expresses its refusal to obey the mahout. It often reveals the inexperience of a mahout who has not been able to establish a proper bond with the elephant. However, such refusal may also be because of stones or thorns on the ground or in the water, a small animal (snake, rat) that scares the elephant, or a foul smell of urine or dung.



#### 4. Feed

The history of the elephant's evolution, its body size, physiology and dentition, its adaptation to various climates and vegetation types determine the feeding habits of the species. The body size of the elephant requires a large quantity of energy; therefore, 16–18 hours per day are spent in feeding. The daily quantity of fodder consumed by an elephant in the wild has been estimated to be 4% of its body weight and 6% for a lactating female. Thus, a male weighing 5 tons consumes 200 kg of fodder per day, and a female weighing 2.5 tons consumes 100 kg normally or 150 kg if she is pregnant or lactating. Obviously, the requirement of such a quantity of fodder is one of the reasons why the elephant is a 'grazer' (eats grass) as well as a 'browser' (feeds on various high growing vegetation in the forest). Its trunk allows the elephant to detect, select, collect, clean and prepare its food from tiny twigs to large branches and from ground level up to 6 metres in height. Consequently, they consume more than 100 plants and their parts such as trees, leaves, branches, bark, fruits, shrubs, creepers, lianas, roots, grasses, forbs and aquatic plants (Sukumar, 2003).

The availability of fodder and feeding habits vary according to the season. Thus, as much as 90% of feeding time is spent in browsing during the dry season, while more time is spent on grazing in the wet season when the grass is high. Young elephants spend more time grazing than browsing, as it may be more difficult for them to reach higher vegetation. The fact that one type of plant is eaten more often in a given season does not necessarily mean that it is preferred, but rather this is determined by its availability.

Elephants also need minerals (sodium, magnesium, sulphur, phosphorus, copper, manganese, zinc, iron, selenium, iodine and cobalt) that they find in plants; however, they also eat mud in specific areas known as 'salt-licks' that contain minerals that are essential to their biological needs. Altogether, the pace at which an elephant eats in the wild is regulated by the time it takes to locate and collect the fodder that is distributed in the entire extent of the forest area. Thus, the search for fodder and the many hours spent on grazing and browsing constitute the most important activity for the biological and psychological well-being of the elephant. Clearly, it is easy to understand that to replicate this diet in captivity is a complex problem.

The elephant is a non-ruminant herbivore with a simple stomach similar to that of horses. The transit time of digestion is 21–24 hours for Asian elephants and 10–18 hours for African elephants (Matthen, 2003). The quantity of feed is usually expressed in dry matter as a percentage of the body weight of the animal ('dry matter' means that it does not include the weight of the water contained in the plant tissues). Asian elephants consume 1.2% to 1.7% of dry matter per kilo body weight (Matthen, 2003), although free-ranging elephants are found to consume 1.5% in dry season and 1.9% in the rainy season (Sukumar, 1989).

The daily energy requirement of an adult elephant is 49,500–70,400 Kcal (1 Kcal = 1000 calories) for a body weight ranging from 2500 to 4000 kg (Mikota, 1994). Other studies give higher figures, and lactation and growth calls for additional 25–50% extra energy.

In captivity, the bulk of this daily requirement is provided under the form of 250–300 kg of green fodder for an adult elephant and a supplement ration.

**Supplement ration.** Traditionally in India, working elephants were given a supplement ration to compensate for grazing time lost during working hours. Today this practise continues and elephants are given either balls of boiled *ragi* (*Eleusine caracana*) and *horse gram* (*Dolichos biflorus*), or paddy (*Oryza sativum*) rolled into a handful of hay (*koochras*), or even cooked rice wrapped in banana leaves, complemented by coconuts or *jaggery* and salt. The Karnataka Forest Code, 1976, has a chapter on elephants that gives a ration chart (see Chart 2) initially designed for timber elephants. These animals had to produce 6–8 hours of hard work per day and were allowed to graze freely in the forest for the rest of the time including the night. However, the quantities shown in the chart were reduced by half during the non-working season, i.e. during the monsoon when fodder is plentiful in the forest. In another reference, from the Kerala Forest Department, the ration chart (Chart 3) is designed for captive elephants that do not graze in the forest. Therefore, it also shows the quantity of green fodder to be added to the supplement ration. In comparison, Chart 4 shows alternative rations for Asian elephants in European zoos. These charts are reproduced verbatim here although they need to be reassessed (see following paragraphs, especially *Jaggery and Salt*).

A special ration may be prescribed by the veterinary doctor in the case of sick elephants, pregnant or lactating females and calves (see *Pregnancy and calf care*).

Chart 2: Daily supplement ration for free-ranging elephants

Age / Height of elephants	Ragi per day	Horse gram per day	Rice per day	Paddy per day	Coconut oil per month	Coconut per day	Jaggery per day
Below 1 year	1 kg	1 kg	2 kg	—	200 ml	1	250 g
Up to 180 cm	3 kg	2 kg	4 kg	—	400 ml	1	250 g
180—215 cm	4 kg	3 kg	—	6 kg	600 ml	—	250 g
215—245 cm	6 kg	6 kg	—	8 kg	600 ml	—	250 g
245—275 cm	7 kg	7 kg	—	10 kg	600 ml	—	250 g
Above 275 cm	8 kg	8 kg	—	12 kg	600 ml	—	250 g

Source: Karnataka Forest Code, 1976

Chart 3: Daily supplement ration and green fodder for non-grazing elephants

Item	Age of elephants							Above 20 years			
	6-12 months	1-2 years	2-4 years	4-7 years	7-12 years	12-20 years	Male	Female	Male	Female	
Milk	10 litres	10 litres	—	—	—	—	During Rest				During Work
Ragi	4 kg	3 kg	4 kg	6 kg	6 kg	2 kg	2 kg	2 kg	7 kg	6 kg	6 kg
Horse gram	—	1 kg	2 kg	2 kg	3 kg	4 kg	2 kg	2 kg	5 kg	4 kg	4 kg
Wheat / Rice	—	1 kg	2 kg	2 kg	3 kg	3 kg	2 kg	2 kg	3 kg	3 kg	3 kg
Salt	20 g	50 g	50 g	100 g	100 g	100 g	100 g	100 g	100 g	100 g	100 g
Minerals	25 g	50 g	75 g	100 g	100 g	100 g	100 g	100 g	100 g	100 g	100 g
Jaggery	250 g	200 g	100 g	100 g	50 g	50 g	50 g	50 g	50 g	50 g	50 g
Green Fodder	10 kg Grass	50 kg	100 kg	150 kg	200 kg	250 kg	250 kg	250 kg	250 kg	250 kg	250 kg
Water	Ad libitum (As much and as often as desired)										

Source: Kerala Forest Department

Chart 4: Standard daily ration for Asian elephants in European zoos

Item:	Adult Female	Adult Male
Horse feed or special herbivore pellets	3—7 kg	5—9 kg
Vegetables (carrots, cabbage, lettuce, turnips)	6—15 kg	12—15 kg
Fruits (apples, watermelon, etc. few or no citrus fruits)	6—8 kg	6—30 kg
Hay	20—50 kg	30—50 kg
Tree Branches	Ad lib.	Ad lib.

Source: Renvoisé, 2008 (Pers. comm.)

A chart should be posted at the feeding place with the rations prescribed for each elephant. The officer in charge or the manager should check regularly that the rations correspond to the chart.

In any case, the supplement ration should not be deposited on the ground for the elephant to pick it up by itself, but hand fed by the mahout, as this is an important gesture in the development of trust between the elephant and its mahout.

**Alternative rations in zoos.** In zoos located in regions where *ragi* or rice are not cultivated, the traditional supplement ration is replaced by compounded horse feed or herbivore feed specially manufactured for zoos (see Chart 4) that consists of cereals, grams, soya bean, linseed, etc. along with a variety of minerals and vitamins. Some zoos also give elephants 1–2 kg of wheat bread or 2–3 balls of a cooked mixture made of oat flakes and barley flour (in a ratio of 2:1) boiled in 6 litres of water and 6 litres of milk. Also, 6–15 kg of vegetables plus 6–30 kg of fruits and 20–50 kg of hay is given to compensate for the absence of tree species found only in the elephants' home range. However, it has been shown that zoo elephants in Europe and the USA may be prone to a deficiency of Vitamin E, calcium, iron and other nutrients, which may be one of the causes of their low reproduction rate (Dierenfeld, Mikota et al., 1994).

**Exercise.** Adequate feeding should go hand in hand with sufficient physical exercise. A few zoos, like Bannerghatta near Bangalore and Vandalore near Chennai, permit the free ranging of elephants during the night. Often, zoo and temple elephants are overweight and lack proper muscle mass, a situation that has negative consequences on their health and

reproduction capacity. This is due to a combination of rich feeding and lack of exercise. Over feeding this is sometimes done intentionally by the keepers to pacify stressed elephants. Zoos that attempt to create the optimal conditions for breeding place their female elephants under a special diet and give them exercise. All captive elephants should be made to walk a couple of kilometres every day, outside the enclosure if it is too small. Some zoos have also developed different devices such as nets of hay hanging above the elephants to force them to raise their trunk and produce some effort for obtaining the hay. The keeper should give some of the food by hand to each elephant. The rest should be placed in different spots of the enclosure in a way that they have to look for it and take it little by little. It should be distributed two or three times a day instead of being piled up on the ground at one go where a part of it will be wasted (see chapter on Zoos).

**Cooked or raw food.** During the timber operations, cooked food and *jaggery* were given to elephants because it is digested faster and *jaggery* gives a boost of energy to the animal when it has to generate high effort. This practice continues in elephant camps in southern India, although *ragi* balls have finally been replaced by raw paddy and hay (*koochras*) in Karnataka Forest Department camps in 2011-12. In fact, some captive elephants do not accept cooked food at all. Cooking the food of elephants may help in killing certain germs in the food that is often stored for a long time before use, but also reduces its nutritive properties. Cooking food in large quantities is time consuming, requires a lot of wood, adequate vessels and a lot more manipulations by the mahouts in conditions that are often unhygienic. The cooked food should not be



given the next day but prepared fresh every day, early enough so it can be cooled and fed to the elephants before work begins. Altogether, the complication of cooking food for elephants makes it an extra task in the daily routine of the mahouts and its benefit for the animals is not proven.

**Food quality.** Today, when pesticides are widely used in agriculture, the quality of elephant food should be checked. Instead of entrusting a contractor with the delivery of *ragi* or paddy of unknown origin, it is preferable to buy it directly from a local agriculturist who does not use pesticides. Vandalore zoo in Chennai even has its own fodder farm.

The food and the containers used to store or cook it as well as the hands of the mahouts should be clean. The food should be free from all mouldy or insect-eaten grains and also free from sand, gravels, stones, etc. as it wears out the teeth of the elephants prematurely. It should be stored in containers inaccessible to rats or other pests. The buckets should not be rusty. Cooked food should be well boiled in alloy or steel vessels. Copper pots should be regularly coated with tin. Flies should not settle on the food while cooling and contaminate it. All utensils should be washed daily and properly after use. The hay should be well dried and properly stacked on a platform above the ground so that it does not get mouldy in the rainy season.

**Jaggery.** The principle of giving jaggery to elephants needs to be reconsidered. Real jaggery is a coarse dark brown sugar made by evaporation of the sap of palm trees and is rich in nutrients. But in fact, jaggery is expensive today and usually replaced by unrefined sugar sold under the name of jaggery that aggravates the worm problem in the elephant's

intestines. Consequently, the animal feeds poorly, gets diarrhoea, cannot be bathed and needs deworming, which is a disturbance in regular healthy feeding. Instead of sugar or jaggery, it is better to give 2–4 coconuts, bananas and other fruits, or 2 fresh sugarcanes that contain a good quantity of natural sugar. A few citrus fruits may also be given.

**Salt.** Veterinarians, and most ration charts, recommend 100 g of salt per day for adult elephants as it assists in the assimilation of nutrients during digestion and the elimination of parasites from the intestines. It also increases the intake of water, which helps in the thermoregulation of the animal. But diverging opinions exist on the subject. Mahouts of long experience consider that 100 g of salt per day is too much, especially for free-ranging elephants as they become addicted to salt, lose interest in the fodder from the forest, do not graze sufficiently and increasingly rely on rations. They also consider that salt makes the elephants thirsty which is a problem during the dry hot season. Therefore, they recommend that 100 g of *rock salt* should be given punctually when an elephant has a problem of indigestion (or twice a month); otherwise, 50 g of common salt should be mixed with the daily ration during monsoon. The fact that wild elephants have no access to pure salt gives some ground to the assumptions of the mahouts. The ration chart designed for the Karnataka Forest Department timber elephants (Chart 2) that were allowed to graze in the forest does not include any amount of salt. Therefore, until new evidence is brought into this discussion, we suggest following the advice of the mahouts, especially for free-ranging elephants that will be quick to locate salt-

licks and eat mud charged with minerals when they need it.

**Green fodder.** Apart from the supplement ration discussed above, the bulk of an adult elephant's diet is provided under the form of 250–300 kg of green fodder per day for an adult, principally comprising grasses, tree branches and palms. Tree leaves contain substantially more protein (12–18%) than grass (3–12%). Mahouts should know which species the elephants like and should care to cut branches without killing the trees. However, among the many tree species eaten by elephants in the wild, few are available outside forest areas.

The Ficus family (that bear figs) or Moraceae, are evergreen trees that provide fodder throughout the year. Young branches and new leaves are preferred for the content of latex that makes it sweeter. From this large family of trees, three species have been planted and protected extensively in South Asia in the course of centuries.

The Banyan tree (*Ficus benghalensis*) was planted on roadsides in the past precisely to provide fodder for elephants. (Hindi and Bengali, *Bar*; Gujarati, *Vad*; Marathi, *Vada*; Telugu, *Marri*; Tamil, *Al*; Kannada, *Aladamara*; Malayalam, *Aal Maram*; Burmese, *Pyin-vaung*)

The Pipal tree (*Ficus religiosa*) owes its name to the belief that the Buddha received enlightenment while seated under a Pipal—also called the Bodhi tree—in Bodhi Gaya. For this reason, this tree is sacred for Hindus and Buddhists; the mahouts may therefore not be allowed to cut its branches in villages. The species has run wild all over the subcontinent and Burma. (Hindi and Punjabi, *Pipal*; Marathi, *Pimpal*; Gujarati, *Piplo*; Bengali, *Ashuvatham*; Kannada,

*Alalimara*; Tamil, *Arasamaram*; Malayalam, *Arasu*; Burmese, *Nyaung Bawdi*).

The jackfruit tree (*Artocarpus heterophyllus*) originating from the Western Ghats is cultivated elsewhere in India, in Sri Lanka, Bangladesh and Burma, for its large fruits that are also relished by elephants. (Hindi, *Kathal*; Marathi, *Phanas*; Bengali, *Kanthal*; Kannada, *Halasu*; Tamil, *Pilapalam*; Malayalam, *Pavu*; Burmese, *Peinne*).

Two species of palms (Family: Arecaceae) are commonly given to elephants. The Fish Tail Palm (*Caryota urens*) is distributed from Nepal to Assam, Manipur, Western and Eastern Ghats, Nilgiris, Chittagong, Northern Burma and Sri Lanka. The species is also cultivated in plantations as the flowering stalks are tapped for toddy. Elephants eat the palms and the trunk, which they open with their tusks and feet. Its strong fibres were sometimes used to hobble elephants in Burma. (Hindi, *Mari*; Gujarati, *Shakarjata*; Marathi, *Berli*; Telugu, *Jilugujattu*; Kannada *Bagane or Baine mara*; Tamil *Teppili*; Malayalam, *Anapana*; Burmese, *Minband*).

The Coconut Palm (*Coco nucifera*) is widespread and cultivated throughout the tropics and the coastal areas. Its palms and nuts are given to elephants. (Hindi, *Nariyal*; Marathi, *Narel*; Bengali, *Dab*; Kannada, *Tengina mara*; Tamil, *Thenai*; Malayalam, *Thengu*)

The Mango tree (*Mangifera indica*, Family Anacardiaceae) is an evergreen tree cultivated all over India since at least 4000 years. Elephants eat the branches and its fruits. (Punjabi, Hindi and Bengali, *Aam*; Gujarati and Marathi, *Amba*; Kannada, *Mavinamara*; Tamil and Malayalam, *Mamaram*; Telugu, *Mamidi*)

Elephants eat the young branches and the bark of Teak (*Tectona grandis*) but the high commercial

value of its timber makes plantation managers reluctant to let mahouts cut branches.

Bamboos (*Bambusa* and other genera, Family Gramineae) are a good fodder for elephants but are seldom found outside forests today. However, this plant and especially the shoots contain a high level of toxins; therefore, elephants should not be fed exclusively on bamboos.

Elephants are also fond of banana plants (Family Musaceae), wild or cultivated, and fruits, but it may not constitute a complete fodder alone.

Reeds that grow in water or in marshy areas should be given occasionally and in small quantities as they can enhance fascioliasis (liver flukes) and provoke diarrhoea.

Mahouts or grass-cutters should attempt to provide as many variations as possible in the provision of green fodder.

**Free-ranging elephants.** It is best to allow captive elephants to graze in the forest so that they can select the green fodder they need. Elephant owners may apply for a grazing permit from the Chief Wildlife Warden although the policy in this regard varies from state to state. In any case, the health condition of the animal (disease, old age, pregnancy, etc.) as well as its life history (confiscated, rescued elephant) should be taken into account before a captive elephant is allowed to graze in the forest; further, it should always be monitored closely.

In forest areas, elephants should be let free to graze in the forest day and night. This provides the elephant with the largest portion of its food requirements, as well as exercise, shade, water and social interaction, and it reduces its dependence on the mahout. However, they should be taken to a good grazing area inside the forest instead of leaving

them close by the camp where there may be little or no fodder. The quality of feeding of a free-ranging elephant depends on several factors: whether the elephant is free to graze day and night or if it is working part of the day; if its movements are restricted by hobbles, fences or other impediments; if the forest area is degraded and the food items scarce; and if the grazing area is also used by cattle. If an elephant has to be temporarily tied, sufficient branches should be cut and placed within its reach, then cleaned and renewed morning and evening. The elephant should also have access to clean water twice a day.

**Good and bad points of ration.** In principle, if a captive elephant is allowed to graze 16–18 hours per day in a well-preserved habitat, it should be able to satisfy its food requirements by itself, just like a wild elephant. In such a case, the main justification of the supplement ration is to keep the bond with the mahout. That is why the ration should be hand fed by the mahout. But in reality, camp elephants are rarely given enough time to graze, even when they are not used for any work, therefore, the ration cannot be avoided. In the dry season when fodder is scarce in the forest, when a female is pregnant or lactating, or when an elephant has to work for several hours or is sick, then, a ration is indispensable. However, no elephant should be maintained exclusively on ration.

One major drawback of excessive stall-feeding is that it discourages the animal from grazing in its natural habitat. It comes back near the camp and waits for the next ration or searches for cultivated fields and raids the crop. Foraging is one of the most important activities of an elephant not only from a physical and physiological point of view but also

socially. Young elephants learn how to graze and select their fodder in the forest from their mothers and other elephants in the herd; this learning process is an essential activity in the development of the animal. They actually place the tip of their trunk near or inside their mother's mouth to smell what she has eaten and learn how to identify the plant. Wild and captive males also break trees or large bamboos, or use their tusks to remove the bark of trees and share it with females that usually cannot have access to such food. Grazing in the forest is also an opportunity for free-ranging elephants to interact with wild ones, which may be a prelude to mating. Finally, grazing freely in the forest naturally regulates the pace of feeding and digestion. Stall-fed elephants eat faster and waste a large portion of their food. It has been observed that elephant calves with their mothers grow better than orphaned calves rescued from the wild and entirely hand-fed. So one should keep in mind that rationed food disrupts the natural feeding habits of elephants, and it always remains a compromise to what takes place in the wild.

## 5. Work and activities

**History** has not recorded how, probably more than 4000 years ago, the tribes of the Indian subcontinent first realised that the elephants could be tamed and trained, thus used for greater purposes than just killed for their flesh, skin, bones and ivory.

The sheer size of the elephant soon promoted it to a beast of burden and a war animal in the Indian subcontinent that lacked horses until the Aryans reached the Indus valley around 1500 B.C. The Greek campaign of Alexander the Great in northwest India in the 4<sup>th</sup> century B.C. is marked by the first encounter of Europeans with war elephants. This capacity to impress fear in the enemy and the intelligence of the animal earned the elephant a special status in early civilisation. While earlier tribes might have worshipped the elephant, it first gained a religious significance with Jainism and Buddhism (600 B.C.) that promoted a principle of non-violence (ahimsa) towards all creatures, and the belief that Buddha was a reincarnation of a white elephant. The first Mauryan emperor Chandragupta Maurya (300 B.C.), who turned to Jainism, is known to have kept an army of 9000 elephants. His grandson, Ashoka, converted to and promoted Buddhism that eventually spread all over Asia, carrying along with its principles a sacred value for the elephant, later embodied by the Hindu god Ganesha that has had a considerable influence on the protection of the species throughout history. The *Arthashastra*, attributed to Chandragupta's chief minister and advisor Kautilya (also known as Chanakya), testifies to the creation of sanctuaries to protect and supply elephants for the army. The *Arthashastra* also gives instructions on the capture,



training, diet and health care of elephants (Rangarajan, 1992).

The figures of 12,000 elephants in the Mughal stables and 40,000 altogether in the kingdom, during the rule of Akbar's son Jehangir (1605–1627 A.D.) are often quoted to show the major role of war elephants in Indian history, a role that declined with the introduction of cannons and gunpowder on battlefields. Apparently, Muslim rulers respected the Hindu sacredness of the elephant and would hunt to capture but not to kill them, and in fact, the system of elephant management developed by the Mauryans seems to have been kept practically unchanged for 2000 years until the arrival of the British (Sukumar, 2003).

Big-game hunting became a sport for the British who were not culturally prejudiced against killing elephants. Timber extraction was also developed to a scale unseen earlier. The Bombay Burmah Trading Corporation had 4000 elephants dragging timber in Burma alone. The very same elephants also played a role as war animals, alternatively in the hands of the Allies and the Japanese, carrying ammunitions, refugees and supply, even trained to pull Bofors cannons in Burma during World War II (Williams, 1953).

**Today**, all activities involving elephants derive from methods developed in the past but none absolutely requires the employment of this animal anymore. However, work may be beneficial for captive elephants. In the wild, elephants have the capacity to exercise, walk long distances, search for their own food, break branches and trees, and interact with other elephants. In captivity, space is limited, food is obtained without any effort; elephants are often tied for long periods, deprived of social interaction and

possibilities to mate. Therefore, work helps to keep the animal in a better condition and if handled appropriately, releases stress.

**Timber dragging.** All Asian countries have banned the exploitation of timber except Myanmar (Burma), the only country where elephants are still used in the timber industry. Timber extraction without prior permission was prohibited by the Supreme Court of India in 1994. Elephants are still used to collect dead and fallen trees in the forest or timber in private plantations, which is a good exercise for the elephants and the mahouts as it challenges their capacity of communication, coordination and dexterity. Ferrier (1947) and more recently the Kerala Captive Elephants Rules, 2003 (see chapter on Laws) fix limitations on the workload of elephants that should be adopted everywhere.

Chart 5: Maximum load for working elephants

Height of elephant	Maximum weight of load to be carried	Maximum weight of log to be dragged
Below 1.50 m	None	None
1.50–1.80 m	150 kg inc. mahout	None
1.81–2.10 m	200 kg	None
2.11–2.25 m	200 kg	750 kg
2.26–2.55 m	300 kg	1000 kg
Above 2.55 m	400 kg	1000 kg

Source: Kerala Captive Elephants Rules, 2003

The load scale should be reduced by 50% in hilly or difficult terrain. Elephants beyond 60 years of age, females in gestation or with a calf at heel and sick elephants should not be used. Still, this may only be undertaken for a maximum of 6 hours per day, with an adequate harness and in appropriate conditions. The work should start early in the morning by 6 or 7 o'clock, when the temperature is cool and after the elephant has been fed its ration, and should stop by

midday before the temperature is too high, then from 3 to 6 in the afternoon, five days in a week at the most. Tuskers are capable of lifting logs with their tusks, but care should be taken that the weight of the log is in accordance with the previous chart of the load to be carried. The mahout should make sure of the proper use of the tusks to lift a load as this operation may damage the root structure and even break the tusks (see Decay of Dental Pulp). A proper observation of the animal can reveal earlier injuries that make the use of tusks painful. Females should only handle lightweight poles. This activity should not be undertaken without experienced mahouts who know the many technical aspects of this activity and should be interrupted during the rainy season when the ground is slippery and dangerous. All elephants used for timber dragging should be equipped with a proper harness.

In the past, during timber operations, a harness known as *kati-collar* was used. It consists of a quilted saddle pad (*namda*) folded into two and a wooden support (*kati*) designed to protect the spinal column of the elephant, tied in a specific way with a long thick hemp rope (*pundi nar ki rassi*). For timber dragging, the rope is not tied around the neck in order to prevent any accidental strangulation of the elephant during the operation, and is equipped with a leather *bellyband* and a tail protection or crupper (*dhoomchi*) to protect the skin from the abrasion of the rope. The *dhoomchi* is made of a U-shaped iron pipe covered with thick leather through which the rope passes. The *collar* is woven in Burma, but in India, it is made of chains covered with hemp, jute and leather, with hooks at its ends. It is designed so as to distribute the effort on the chest and the back of the elephant (see Plates 3, 4 and 6). A long chain equipped with a hook on one end and a

ring on the other is then tied to the log or pile of poles and hooked to the harness. This equipment is designed to protect the elephant from a back injury when it has to produce a great effort. The *kati-collar* also provides the mahout with a safe seat on the back of the animal, especially useful when the elephant goes on its knees to push or lift a log with its trunk or tusks. Actually, it is the *kawadi* (assistant mahout) who should be riding the elephant while the mahout supervises the work from the ground in order to prevent any mishap. The length of the drag-chain should be sufficient so that the elephant may not hit its hind feet against the log while pulling, especially on downward slopes.

This type of equipment was maintained in the Forest Department camps until the 1990s but has now been discarded. The Department should reconsider the use of *kati-collar* and keep a few of them ready in each camp as it is indispensable when an elephant has to be used for work, even occasionally. The *kati-collar* can be made at a low cost by a local carpenter, a blacksmith and a cobbler, while the stuffing of the collar, the *namda* and the rope should be made by the mahouts themselves. If maintained properly, it can be used for many years. The preparation and use of such equipment is an activity of great importance in the improvement of the experience and motivation of the mahouts. Very few of them, only the older ones who used this equipment in the past, know how to make and use it properly today.

The following chart gives the characteristics of various hemp ropes used for elephants during training and work. (Note: In Assam, a *phan* is a neck noose, while in Mysore, it designates a leg noose.)

Chart 6: Types of hemp ropes used for elephants.

Ropes	Length		Thickness	Number of strands*	For a 2-year-old calf		
	Male	Female			Length	Thickness	Strands*
Name and application:							
Dole (Neck noose / Training)	11 m	10 m	10 cm	3 double	10 m	6 cm	3 double
Phan (Leg noose / Training)	13 m	12 m	7.5 cm	3 double	10 m	4 cm	3 double
Chouri (Small rope / Fastening)	1.5 m	1.5 m	1.5 cm	1	1.5 m	1.5 cm	1
Padha kas (Riding)	18 m	16 m	4 cm	3	7 m	2.5 cm	3
Kilava ka rassi (Neck rope)	8 m	6 m	1.5 cm	1	3 m	1.5 cm	1
Gaddi ka rassi (Saddle rope)	20 m	18 m	3 cm	3	—	—	—
Kati collar ka rassi (Dragging)	18 m	16 m	3 cm	3	—	—	—

\* Note: The thickness of the strands varies according to the type of rope.

**Harmful dragging method.** A number of Kerala elephants are used to drag timber in plantations in southern India by a method also observed in Sri Lanka (Williams, 1953). It consists in tying the log with a chain at the other end of which a piece of rope (now in nylon) is attached and often rolled into a thick bundle. The elephant is ordered to bite the rope and pull the log while walking backwards. Obviously, this technique wears out its molars prematurely, and when an elephant is not able to chew, it eventually dies of starvation (see Dentition).

**Tourist rides.** With the development of tourism in recent years, department and private elephants are now used for 'elephant rides' in historical sites or 'safaris' in forests, inspired by the parades and hunting parties of former rulers. Here again, numerous precautions should be taken. This activity should be undertaken only if all other requirements for the welfare of the elephants are met. **Only elephants of above 20 years of age (or 2.50 m in height for males and 2.25 m for females), well trained and in good health should be used.** Gestating or lactating females, retired or sick elephants should not be used under any circumstances. For obvious reasons of security, males in *musth* should not be taken near tourists at all. **The load should be limited to two passengers, one mahout, the harness and the howdah.** A platform at an adequate height should be prepared to allow the tourists to climb on the elephant's back. **In no case should the elephant be asked to sit down on its stomach repeatedly or for too long as it may suffocate.** Because elephants do not have a diaphragmatic barrier, in sternal recumbency, the abdominal mass presses directly on the lungs. This position prevents it from breathing normally.

The use of elephants for tourist rides should not compromise the health of the animals. The elephants must be watered, bathed and fed properly before work. Tourist rides should be done during the cooler hours of the day in the morning and late afternoon. Elephants should be rotated so that an animal used in the morning should be allowed to graze in the afternoon and vice versa, elephants used in the afternoon should not be used in the morning. Elephants should not be made to stand without food, or wait for tourists under the hot sun. Elephants should not be used to carry tourists or any load in the forest during the monsoon as the ground is slippery and elephants may injure themselves. In any case, elephants should not be used for any work more than five days in a week, leaving two full days for rest and should rest completely during monsoon.

The equipment used to carry tourists on the elephant's back should be well designed and in perfect condition. It consists of a quilted saddle pad (*namda*); a saddle (*gaddi*); a platform (*howdah*) that is nowadays made of a steel or aluminium pipe structure for the tourists to sit and hold themselves safely; a hemp rope (see Chart 6) with leather protections: *neckband*, *bellyband* and tail protection (*dhoomchi*). All this equipment (except the *howdah*) wears out quickly when used regularly, so double sets should be ready and at hand and the old ones should be refurbished immediately. In some cases, nylon ropes are being used to replace hemp ropes. This should be stopped immediately as nylon ropes rub and cut the skin of the animal within a very short time. Coconut fibre (*coir*) ropes are also to be avoided for the same reasons. Only hemp ropes are adequate to harness an elephant. The rope should not hurt the teats of females nor be too tight around the neck. Leather protections should be used to prevent

the rope abrasions against the skin around the neck (*neckband*), below the chest (*bellyband*), and below the tail (*dhoomchi*), usually a U shaped pipe covered with leather (see Plates 3, 4 and 5).

The use of the *namda*, *gaddi* and *howdah* is to protect the back and especially the spinal column of the elephant. To be effective, these three elements should be adapted to the size and girth of each elephant and stuffed adequately. A *gaddi* should not be stuffed with hay but with long dried reeds (e. g. *Typha latifolia* L.) that have sufficient resistance and rigidity to provide a firm protection between the *howdah* and the *namda*. It is essential that the spinal column should be absolutely free of any pressure (see Plates 6 and 7).

The *namda* (usually stuffed with coir) should be thick and fall low enough on the flanks so that the feet/shoes of the passengers do not rub the skin of the elephant. Anyone, including mahouts, climbing on a bare back elephant should be asked to remove his footwear as a measure of cleanliness and respect. Walking in steep terrain whether upwards or downwards requires precaution. Passengers should remain quiet and not do anything that may disturb the elephant. The mahout should pay attention to low branches or thorns that may hurt the passengers. While pursuing wild animals during safaris, the elephant should be kept at a safe distance.

When the ride is over, the equipment should be removed immediately and stored properly, and not left on the ground, in humidity or under the rain. The mahout should immediately massage the back of the elephant. Then the elephant should be given a second ration and allowed to cool down before being watered.



**Circuses.** Elephants have been associated with circuses since antiquity. The Romans used both Asian and African elephants in animal fights, against each other, and against lions, leopards or armed men (Gröning & Saller, 1998).

With the increase in sea trade in the 19<sup>th</sup> century, elephants began to appear in more and more circuses in Europe. Soon, it was no longer sufficient to simply exhibit or ride elephants, and they were trained to perform increasingly difficult tricks. The training methods were very similar to those used by Asian mahouts until the end of the 19<sup>th</sup> century, when in 1890, in Hamburg (Germany), Carl Hagenbeck established a training school alongside his circus, teaching a new method based on his experience with wild animals and Indian mahouts, which largely forms the basis of elephant training in circuses today (Gröning & Saller, 1998).

It is impossible to make elephants perform circus shows without inflicting a long, stressful and often painful training upon them. What the public does not see is that in order to appear in the ring for a few minutes per show, circus elephants spend years in trucks, trains, chained in temporary shelters such as tents that do not provide cool shade, and no water tank for bathing. This results in severe stress and deeper psychological disorders revealed by stereotypic behaviours such as a permanent swaying of the head or repetitive movements of the body. Today, the public has more opportunities to see elephants in their natural environment on television and acquire a better understanding of the species and its ecology. In consequence, more and more people react negatively to the sight of a chained elephant or to situations that are obviously unnatural.

The principle of circuses has gradually evolved in recent years. Modern circuses have abandoned

shows involving wild animals, especially endangered species such as elephants, and yet remain capable of presenting successful shows. Therefore, it cannot be said that elephants are absolutely indispensable to circuses; all circuses need to evolve with time and the imperatives of wildlife conservation. However, despite this, more than 400 Asian elephants continue to be kept in circuses around the world (Clubb & Mason, 2002), and 92 in India alone (Project Elephant, 2008).

In India, circuses are included under the definition of zoos in the Wildlife Protection Act, 1972 and subject to rules and norms prescribed by the Central Zoo Authorities of India. The CZA and Project Elephant have initiated a programme of listing and identification of circus elephants with microchips, which has been widely recognized as a reliable method to mark elephants (see Registration). These elephants should also be checked regularly by specialized vets appointed by the CZA, in order to monitor their health condition, prevent mismanagement and in some cases, cruelty during training or transportation, such as the use of electric goads. Certain tricks that may be painful or dangerous for the elephants should be banned along with performances by pregnant elephants and calves. Circuses should also have adequate arrangements to deal with males in *musth* and a facility to bathe the elephants. However, realising that the minimum standards for the keeping of elephants set by the Recognition of Zoo Rules, 1992, were not applied in many cases, in November 2009, the CZA has directed all circuses (and zoos) to relocate elephants to forest areas. First of all, the health condition (especially TB and herpes) of these animals should be assessed as well as their behaviour, as circus

elephants are found to behave very erratically and present a risk for the mahouts.

**Temples.** In 2000, Project Elephant estimated that 192 elephants are kept in temples, principally in southern India, but the figure is much higher if one includes ashrams and sadhus' elephants that are sent to beg in the streets. A total of 1400 elephants were counted at the 1994 Kumbh Mela in Allahabad, Uttar Pradesh by Dr. D. N. Tewari (Lair, 1999).

Temple elephants embody the sacredness given to this animal in Asia throughout history; they are described in Hindu scriptures as vehicles of gods and a manifestation of Lord Ganesha. Many Indians only see elephants in temples, where they seek the 'blessing' of the animal that places its trunk on their head against an offering of a few rupees. Of course, this behaviour is the result of training that is continuously induced discreetly by the mahout, usually seated at the feet of the animal. Temple elephants are also trained to 'worship' a deity by lowering their head, kneeling down, raising their trunk in front of the shrine. Over time, these repeated movements alter the natural behaviour of the elephant and leads to psychological disorders and stereotypic behaviours also observed amongst circus and zoo elephants.

Temple elephants are also used for festivals in processions where they are decorated, carry a deity on a *howdah*, and have to walk and stand for long hours under the sun, in the midst of large crowds, loud music and the detonations of firecrackers. All this is deeply stressful for the animal.

Moreover, contact with a large number of people increases the risk of tuberculosis being transmitted by humans to elephants and vice versa. A recent study shows that 15% of elephants in southern India

suffer from tuberculosis; the worst hit are the temple elephants (Cheeran, 2008).

In general, the routine of temple life does not provide the elephant with adequate physical activity. Here, the problem is a lack of exercise combined with repeated movements and an excessive feeding of sweet food. In consequence, temple elephants have a tendency to become fat, lack a proper muscle mass and show behavioural disorders. Therefore, temple elephants regularly attack their mahouts or anyone who comes in their way, especially during festivals when they find themselves under extreme stress. In 2007, 64 incidents involving temple elephants in Kerala alone have been reported by the press.

The practical context of temples, especially those located in urban areas, makes it extremely difficult to provide adequate conditions for the keeping of an elephant. Small improvements may be advised such as limiting the time spent in repetitive movements, with several interrupted sessions during the day alternated by other activities such as walking outside the temple whenever a suitable place is available and daily bathing. The elephant should not be made to stand under the hot sun or on hard surfaces. Its feet and nails should be oiled daily and tethering chains tied to alternate feet weekly. One can also prevent the elephant from eating too much sweet food (the offerings of bananas, coconut and *jaggery* should be intercepted by the mahout) and make sure its ration is balanced in quantity and variety of items. De-worming should be done regularly.

The ownership and custody of an elephant confers the owners with the responsibility and the duty to maintain the animal in good health, both physically and psychologically. To this end, elephant owners and temples trustees should enquire about the needs

of such animals in captivity, seek appropriate advice and take the necessary measures to guarantee the welfare of the animals. The problems observed in temple elephants are common in many regards with that of zoo elephants, so it may prove useful to consult the studies undertaken on the subject (see Zoos). However, at a reasonable expense and by employing simple measures, one can make a great difference to temple elephants. One of the measures is to ensure that a veterinary doctor checks the elephant once a month and maintains a health register recording the observations and treatments (see Health care). The doctor should also be called immediately if any problem, ailment or disorder is detected. Temples that have a park or garden, or are located in rural areas should organize an enclosure providing shade and a tank of clean water, where the elephant should be left untied and can rest, walk, play with mud, water, small logs, and eat hay or branches at its own pace at night and during the hot hours of the day.

Together with a systematic veterinary check-up including the detection of transmissible diseases, a program of seasonal transfer of captive elephants to forest camps, as it has been experimented in Tamil Nadu, should be considered. This would allow them to recuperate for a portion of the year and be available for the festival seasons. Since temple elephants are often alone, they would then be able to interact with other elephants, which is essential to the welfare of elephants that are social animals.

**Zoos.** Since ancient times, many rulers around the world have kept wild animals caged in what was called '*menageries*' as a status of power. The concept of zoological gardens evolved from the old *menageries* in Europe in the 19<sup>th</sup> century to display

fascinating, exotic animals that were then unknown to the public in the West.

Recently, 'zoos have changed their emphasis from that of centres of entertainment to those of conservation, education and research, although their actual value in these areas is currently debated' (Clubb & Mason, 2002). In spite of an increase in the number of births in recent years, the population of zoo elephants is not yet self-sustaining. The mortality is higher than the births and zoos still depend on the import of elephants from their home ranges. The elephant was placed in the Appendix I (highest level of protection) of the CITES (Convention on International Trade of Endangered Species) in 1976. Today, elephants may be exported and imported only for the purposes of research, conservation and education.

In India, the Central Zoo Authority has promulgated regulations (Recognition of Zoo Rules, 1992) to guarantee standards for enclosures, hygiene, feeding, upkeep practices and veterinary care to animals, but the number of zoo elephants (82) only account for less than 2.5% of the captive population in the country. In contrast, 210 Asian and 179 African elephants are kept in zoos in the USA, 330 Asian and 230 African in Europe (Captive Elephant Database: Koehl, 2001). The complex problems of keeping elephants in intensive captivity has led to a number of scientific studies, among which the reports by Taylor & Poole (1998, 1999), Kurt et al. (1995, 2007) and Clubb & Mason (2002) offer a rare insight into the condition of zoo elephants, that is also useful to understanding the condition of temple, circus and private elephants.

In European zoos, which shelter the largest population of elephants outside its home range, 59.7% of Asian elephants were caught from the

wild, only 19.4% were born in captivity and the rest were taken from elephant camps. Most elephants caught from the wild came from Burma. All other Asian countries have now banned the capture of wild elephants. Elephants exported from India were principally taken from Forest Department camps where they were born from captive females mated with wild males. The biggest importer of wild elephants (Asian and African) in Europe is Germany, although the Netherlands has imported the highest number of Asian elephants. The import/export of elephants has decreased since the 1990s, especially for Asian elephants. Zoos are still relying to some extent on imports from Burmese timber camps (Clubb & Mason, 2002).

**Space and facilities.** The space allocated to elephants in zoos is the most obvious subject of concern. The European Association of Zoos and Aquaria (EAZA) recommends that outdoor enclosures measure at least 400 m<sup>2</sup> for 3 elephants (i.e. 133 m<sup>2</sup> per elephant) with a further 100 m<sup>2</sup> for each additional elephant. The American Zoo and Aquarium Association (AZA) recommends 167.2 m<sup>2</sup> for a single adult elephant with an additional 83 m<sup>2</sup> for each extra animal. The Central Zoo Authority of India (CZA) has not defined minimum open enclosure for elephants, while it prescribes a minimum of 2000 m<sup>2</sup> for a pair of rhinos.

Indoor boxes or stalls should be at least of 36 m<sup>2</sup> for a female and 45 m<sup>2</sup> for a male elephant according to the EAZA, with a minimum of 150 m<sup>2</sup> for 3 females and an extra 50 m<sup>2</sup> for each calf. The AZA's recommendation is 37.2 m<sup>2</sup> (400 sq. ft) for each animal but smaller enclosures may be accepted on a case-by-case basis during inspections. In India, the CZA has prescribed a night shelter of 8 × 6 m (48

m<sup>2</sup>) with a minimum height of 5.5 m for each elephant.

Still, many zoos do not respect these recommendations. A survey of 20 European and North American zoos shows a range of 17–6937 m<sup>2</sup> per elephant for outdoor enclosures, and between 19 and 171 m<sup>2</sup> per animal for indoor enclosures (Taylor & Poole 1998). In comparison, it has been estimated that free-ranging elephants in Tamil Nadu and in a Sri Lankan orphanage have access to 100,000 m<sup>2</sup> (25 acres) or just under, of natural habitat during the night (Taylor & Poole, 1998). Wild elephants roam over areas at least 60–100 times larger.

Water tanks, mud pools, trees and scratching posts should be available in all zoos to help prevent skin problems. The EAZA states that elephants must have access to a pool of water in the indoor or outdoor enclosure, with dimensions of 2 × 3.5 m and 1 m deep. The AZA only recommends that ‘elephants should have access to water such as a pool, waterfall and sprinklers when outdoor enclosures and weather permits it’. In more general terms, the CZA of India states that ‘each cubicle/cell shall have resting, feeding, drinking water and exercising facilities, according to the biological needs of the species.’

Dry moats have been the cause of many accidents of elephants falling regularly, resulting in injuries or deaths and are now inadvisable. Instead, electric fences are recommended.

Chaining has been used to restrain elephants for many years, and elephants are the only zoo species still managed in this way. A 1998 study showed that 75% of European zoos chain their elephants for 8 hours or more, especially at night to prevent aggressions and accidents (Taylor and Poole, 1998). An American survey (Galloway, 1991) showed that



elephants are usually chained during the time when the handler is not present, that is 16 hours per day. Recent norms prescribed by the EAZA limit the time of chaining to 3 hours per 24 hours and a number of zoos do not chain their elephants anymore but cage them during the night. In India, the CZA states that 'No zoo shall keep any animal chained or tethered unless doing so is essential for its own well being.' Obviously, the recommendations of zoo associations are not sufficient to permit the natural behaviour of elephants, and very few zoos have opened reasonably large enclosures and adopted advanced management methods. Most zoo elephants are not trained enough to be taken outside enclosures for regular walks. As a result of small spaces and chaining, a lack of adequate exercise appears to be a common problem in zoo elephants, leading to obesity, arthritis and other joint problems, and may be related to the lowered life expectancy of zoo compared to wild elephants (Kurt & Hartl, 1995). Captive elephants are highly susceptible to foot problems including overgrown nails, soles and cuticles, foot rot (necrotic pododermatitis), abscesses, split nails and soles. These can develop into chronic long-term problems and can require extreme measures such as amputation or euthanasia. Finally, about 40% of zoo elephants show stereotypic behaviour (Clubb & Mason, 2002) such as swaying of the head and the forepart of the body that may be caused by chaining or limited space.

**Security.** Elephants are the main cause of accidents in zoos. Aggression towards humans makes elephant-keeping one of the most dangerous of all professions. Between 1976 and 1994, there were 21 people killed by elephants in US zoos, most of them trainers and handlers (Biederman, 1994). In reaction,

perfectly healthy animals are judged as 'uncontrollable' and shot or euthanized in secrecy to avoid adverse publicity (Lair, 1999). Consequently, many zoo authorities and elephant keepers have adopted methods of controlling elephants known as 'Protected Contact' where the keepers work through the protection of a cage, or 'Offhand Management' where the keeper has no contact at all with the elephant unless it is chemically sedated (AZA, 2001).

Modern installations for zoo elephants are equipped with electric gates and hydraulic crushes that can safely be manoeuvred from a remote control panel. In 2008, the cost of a small installation for three elephants up to the new standards of the EAZA was estimated at 650,000 Euros (Rs. 45,000,000), an amount that would cover, at the present rates, the total expenses of 10 camp elephants and 20 mahouts for 20 years in India.

The method known as 'Free Contact', originally inspired by the traditional techniques of Asian mahouts but altered by the circus practices is often abandoned due to a shortage of experienced keepers and a fear of the animal. Many zoos have elephants that are not trained and that cannot be controlled, moved or treated easily. Still, elephant keepers and vets have to interact with the elephants, at least for treatments such as foot care. Drastic physical or drug immobilisation methods are then used even for minor interventions and there is no doubt that this is traumatic and risky for the animals. In contrast, the sight of a good mahout riding a big tusker in an Indian village demonstrates the inestimable value of a tradition that is so often despised and neglected.

**Breeding and mortality.** A study of the records of British zoos reveals that in 215 elephants (154 Asian and 61 African) kept between 1902 and 1986, only 7 births took place (4 Asian, 2 African, 1 hybrid), and of the 3 that were still alive in 1986, all were below the age of 5 (Frost, 1986). Not a single calf was born in North America from 1918 until 1962, when the Washington Park Zoo produced the first of a series of 25 calves through the year 1991, including the first second-generation calves to be born in North America (Lair, 1999).

In recent years, programmes of exchange of elephants between zoos have been organised and herd-like groups of elephants have been recomposed and placed in larger enclosures with substantial results. Experiments on artificial insemination have also succeeded, but it remains a complex and expensive procedure. Moreover, the methods used to collect semen from male elephants and for the insemination of females are debatable in terms of animal welfare.

Nevertheless, between 1960 and 1999, 121 Asian elephants were born in European zoos (Clubb & Mason, 2003) while 54 were born between 2000 and 2009, out of which 9 have already died.

In the wild, a female produces on average 1 calf every 4.5–5 years (Sukumar et al. 1997) while the average in zoos is 1 calf every 22 years (Taylor and Poole, 1998); 35% of females in zoos do not breed at all. Though the number of births in zoos has increased, the number of births per female in breeding age has decreased (Clubb & Mason, 2002). The reasons for this are the occurrence of ovarian cysts among 5% of Asian females, stress, excessive body weight, and many females being too old to breed. Other factors are the scarcity of reproductive males, infertility (low sperm quality), lack of social

experience, physical incapacity to copulate due to excessive weight, foot or joint problems and arthritis. In fact, 50% of zoo elephants have foot problems.

In forest camps, only 3% of calves are stillborn (Taylor & Poole 1998) while this number reaches 15% to 24% in zoos. A calf born in a zoo has a 10–30% chance of dying in its first year, and a 10% chance that it will be killed or rejected by its own mother. It is likely to be separated from her prematurely, and even if it survives infancy, its mean life expectancy is only 15–16 years (Clubb & Mason, 2002).

Consequently, there are no third-generation zoo-bred Asian elephants and only 10 second-generation ones in European zoos. Due to a lack of sustained breeding and hence genetic selection, despite long association with man, zoo elephants must generally be regarded as wild, not domesticated, although most have been tamed (Clubb & Mason, 2002).

Most species have a greater life expectancy in captivity compared to their wild counterparts, due to reduced risks of disease, predation, starvation and competition. In contrast, estimates for elephants suggest that they live longer in the wild than in zoos. The mean life expectancy in zoos is 21 years while their longevity in forest camps reaches 60 years. Some individuals have reached the age of 79 in camps (Sukumar, 1989) but the maximum recorded in zoos is 56 years.

Among the causes of premature deaths, one study showed that aggression accounted for 9.4% to 17.7%, excluding infanticide; 3.1% to 9.1% of elephants died under anaesthetic for routine procedures. Malnutrition through an inadequate diet leads to deficiencies in vitamin E, calcium, iron and other nutrients along with intestinal problems such

as enteritis, colic and impaction of the colon (Clubb & Mason, 2002).

Elephants are sometimes said to fulfil a conservation role in modern zoos. However, the conservation organisations WWF, IUCN and Elephants Specialist Group do not consider that captive breeding makes a significant contribution to elephant conservation due to the low breeding rate and high mortality. The welfare and economic costs of conservation of elephants in zoos are also high and hardly justify the role of education. Consequently, scientific reports advise the complete freezing of the import of elephants as well as breeding in zoos until the problems of their conservation are solved. A number of zoos have recently stopped housing elephants and there is some evidence that they do not suffer financially when they do so, if the reasons are explained to the public (Clubb & Mason, 2002).

In zoos that are located in the elephant home range countries, the problems may be easier to resolve. First, the climate is appropriate and large enclosures may be opened. Bannerghatta Biological Park, for example, on the outskirts of Bangalore city, is located at the edge of a National Park with wild elephants. Therefore, the zoo elephants are released every night into the forest. The long experience of training and handling elephants, including males in *musth*, makes it much easier to manage the captive population. The shifting of elephants between zoos and Forest Department camps exists *de facto* in India. This principle should be rationalized and accompanied by methodical veterinary check-ups. However, the November 2009 decision by the Central Zoo Authority of India to relocate all zoo elephants to their natural habitat foreshadows the end of this form of captivity in the near future.

## 6. Mahouts

**Tradition and status.** It is surprising that apart from a few instances, mahouts are hardly discussed in most texts on captive elephants. Mahouts are so essential in the management of captive elephants that in fact, no attempt at keeping elephants in captivity may be considered without them.

The long experience of capturing and training elephants in Asia in the course of centuries has allowed several communities to develop a deep knowledge and practical experience of the species. Originally, there were tribal communities living in forest areas, who were involved in the capture and training of wild elephants and who passed their experience from generation to generation, as it was common in many professions.

Two characteristics define this profession:

- It is based on practical experience acquired in the field.
- It is a family or community tradition.

To understand the people who still practice this profession today, it is necessary to know their background and how they have perceived the evolution of their activity in the course of the last few generations.

Anyone who has taken the time to speak with families of mahouts in recent times must have realised that these people are now deeply disillusioned as they do not see a future in this profession, especially in a fast-changing society. If given the opportunity, many sons of mahouts and young mahouts would rather take up another profession. The cause is probably the degradation of the social status of mahouts in the last few decades.

It is likely that in old times, mahouts enjoyed a relatively good status when they were in charge of

royal elephants, in armies, hunting parties and parades, at a time when elephants were really valued in Indian society. Later, during British times, elephants were so crucial in the extraction of timber that mahouts must have also been relatively well paid and well treated. The large-scale capture of wild elephants in stockades known as *khedda*, traditionally practiced in Assam, South East Asia and introduced in Mysore in 1874 by G. P. Sanderson, a British officer, were high times in the history of mahouts. It was spectacular, risky and attended by the great figures of the time.

From the 1920s, however, the capture and trade of elephants in India was progressively controlled by the Forest Department. A. J. W. Milroy, then Chief Conservator of Forests in Assam, imposed strict rules to regulate this activity and to reduce the cruelty inflicted on elephants during captures. After Independence, the former Indian rulers who used to maintain elephants stables as well as the tradition of elephant keeping gave up this practice. The large timber companies that were colonial enterprises and employed thousands of elephants and mahouts ceased their activities. The Forest Department remained the only employer that could provide mahouts with the indispensable experience of working with elephants in forests. In 1972, the Wildlife Protection Act put an end to the *kheddas*. In Karnataka, the Kabini site where the *kheddas* were undertaken was submerged by a reservoir. Elephants were finally considered an endangered species and the entire policy regarding their management was suddenly reversed. The mahouts felt that their profession was coming to an end. Some of them destroyed their notes on the treatment of elephants taken along many years of practice (a proof that

some mahouts were literate) in the presence of their sons and discouraged them to join the profession. With the prohibition on logging imposed by the Supreme Court of India in 1994, the elephant camps ceased to be profitable to the Forest Department, and the mahouts lost all consideration and status. They found themselves with no other perspective than the tedious routine of caring for the elephants left in the camps. Low salaries, temporary employment, rivalries to obtain permanent postings, social problems and alcoholism have finally undermined what was left of a 4000-year-old tradition.

**In Karnataka**, only two communities practice this profession. The Kurubas belong to a tribal community and are the descendants of the earliest inhabitants of the Nilgiri Hills situated at the common border between the present states of Tamil Nadu and Kerala and in the hill ranges and forested areas of Chamarajnagar, Mysore and Kodagu districts of Karnataka.

The Muslims progressively occupied the south of the Deccan after the fall of the Vijayanagar Empire in 1565. Hyder Ali, the first Muslim ruler of Mysore attempted a *khedda* operation that failed around 1770. A century later, Sanderson brought a number of experienced mahouts from East Bengal (today Bangladesh) to undertake the *kheddas* in Mysore. The mahouts were Muslims and naturally mingled with the Muslim community in Mysore. Mahouts continued to come from Bengal to Mysore until the 1930s, and some of the Muslim mahouts found today in Mysore and in Sakrebail elephant camp (Shimoga) are the direct descendants of these men. The Kurubas have a great aptitude to work in the forest. They are excellent trackers, climb trees with amazing ease, and have a deep traditional



knowledge of plants, trees and wildlife. Over the centuries, these aptitudes have allowed them to trap elephants in pits concealed in the forest and train even fully grown tuskers. They also participated in the *khedda* operations in Mysore. The Kurubas, however, still suffer from a severe caste prejudice and a low level of education.

Muslim mahouts have a basic level of education and are well integrated into Indian society. They usually have more structured methods of elephant training and upkeep but often lack the instinctive approach to the elephant that is typical of the Kurubas. Naturally, some excellent mahouts may be found in both communities.

There is no doubt that the *kheddas* had a negative impact on the population of wild elephants, but it provided mahouts with a unique experience in training elephants, a sense of discipline and pride in their work. However, the last of those men have now retired or passed away and the mahouts in activity today are of a much lower level of expertise. The best of them are still found in Forest Department elephant camps although there are different levels of expertise from one camp to another. The community effect is essential and mahouts working in groups maintain a higher level of expertise even if some individuals show better capacities than others. However, the quality of work of a mahout who is disconnected from his community decreases over time.

**Selection of mahouts.** The above paragraphs give some clues on how to select a mahout in the circumstances that are prevalent today.

A mahout should have trained as an apprentice for a number of years under a senior mahout. It is an advantage if he has some experience of the forest

and possibly of wild elephants, as he will have some knowledge of the requirements of elephants in their natural habitat. He should be physically fit, of even temperament, non-alcoholic and, preferably, adept at jungle-craft.

Of course, it would not be realistic to entrust only one young mahout with the care of an elephant he does not know. It takes some time to assess the behaviour of an elephant, especially if the animal has been kept in unnatural conditions of captivity. The animal may show unexpected and sometimes dangerous behaviours. The mahout may find himself totally overwhelmed and in danger. In reaction, he may use excessive beating, coercive and sometimes cruel methods.

In any case, one mahout and one assistant (*kawadi*) are necessary for each elephant. Often, temples or private owners only hire one proper mahout and in order to spare a second salary, hire one local helper who usually has no experience at all. When the mahout is absent, the helper finds himself in overall charge of the animal, which may lead to catastrophic situations. An elephant will sense instantly if the mahout or helper is not experienced and will instinctively challenge his control.

**Handling an elephant.** Adult elephants have no predators in the wild. In a situation of threat, their natural reaction is to charge and fight in order to assert their position of superiority. This is the instinctive behaviour that mahouts have to deal with. The initial phase of training is to control the aggressiveness of the animal with the use of adequate methods of restraint (ropes, *kraal*), get it used to the presence of man (voice, odour, contact) and to accept food from the hands of its mahouts. The elephant is then taught basic commands. This

initial training should not be cruel and usually does not last more than a few weeks. Elephants are extremely sensitive, intelligent and fast learners. Once learnt, this experience is acquired for life. The elephant is then released under the control of *koonkie* elephants and mounted while additional commands are taught until it executes them readily (see Verbal commands). The next task of the mahout is to develop and maintain a mutual trust with the animal, not a domination based on violence and fear. This trust needs to be re-asserted every day. For the elephant, to lie down for a bath each morning and to receive food from the very hands of the mahout are two essential points displaying trust. Cruelty is definitively counter-productive and reveals the incompetence of the mahout. An elephant that endures unfair treatments gradually rejects all commands, becomes impossible to handle, sometimes aggressive and even in some cases self-destructive. Forcing them to perform tasks that are contrary to their natural behaviour or keeping them in intolerable conditions of captivity inevitably leads to failure.

Incidents in forest camps are extremely rare, even with tuskers in *musth*. The reasons are: a) the conditions of captivity are adequate (space, exercise, social interaction), b) the elephants are not asked to perform tasks that are too different or contrary to their natural behaviour, and c) good mahouts have assimilated the behaviour of elephants so deeply that they can prevent conflictual situations. The best of them do not have to beat their elephant at all, and do not need to use an *ankush*.

**The use of the *ankush*** is a sensitive subject as it is the most visible sign of cruelty inflicted on the elephants. The *ghazbak* (see Plate 2) still in use in

northern India is made of wrought iron with two very sharp points. Some mahouts use two of them at the same time, one in each hand. Likewise, elephant trainers in circuses and zoos use prods or goads that produce electric shocks. The use of such instruments reveals the trainer's wrong assessment of the methods required to control an elephant. The small *ankush* with one rounded point and a wooden shaft (*kokke* in Kannada) is more adequate, although a simple cane is usually sufficient once the elephant is trained. For example, in Mudumalai (Tamil Nadu), mahouts usually do not use an *ankush*. Handling an elephant is more a matter of psychology than force.

**Responsibilities of the employer.** All elephant owners and camp managers should understand that mahouts who are not treated properly do not maintain their elephants properly. Therefore, minimal standards should be respected in the hiring and management of mahouts.

Salaries offered to mahouts should be in accordance with skilled labour in the region of employment. The salary paid by the Forest Department to a mahout according to his experience, his years of service, is a good reference. Mahouts usually show preference for a Forest Department job as it means stable employment, an increase in salary over the years and a pension after retirement. Therefore, employers should offer incentives, have clear agreements with the mahouts and follow strict and fair rules. The stability of the employment of mahouts is essential in the management of the elephants.

Salaries should be paid on time. Incentives such as a 13<sup>th</sup> month salary for mahouts who complete a full year of good service, an increase in salary in the following year, bonuses for special tasks, etc. are good methods to secure the motivation of mahouts.

Fines or suspension may be considered in case of serious misbehaviour or failure to report for duty. The employer should organise for the mahouts to undergo a medical check-up once a year and should take an insurance policy to cover medical expenses and death of mahouts.

Mahouts should be given proper lodging and ration, working uniforms as well as the equipment related to the elephants or the material for the manufacture of such equipment. Any extra cost related to the elephant should be borne by the employer.

A mahout cannot be expected to take care of an elephant 24 hours a day, 7 days a week, 12 months a year. That is one more reason to hire two experienced men for each elephant. When a mahout is given an employment away from his village, he should be allowed to return to his home regularly. While in his village, he will interact with other mahouts in his family, find solutions to problems he may encounter with the handling of his own elephant or reassess his methods while observing other mahouts at work. This is beneficial for the employer.

Employers should know the techniques of elephant upkeep well enough so that they can assess any situation correctly. Their knowledge, fairness and impartiality will help them gain respect from the mahouts. Employers should be aware that a mahout cannot work satisfactorily if the conditions of captivity of the elephant, provision of ration, veterinary care, working schedule and equipment are not adequate. Once a smooth routine is obtained, a mahout should remain in charge of the same elephant as long as possible. However, over time, some mahouts have a better influence over some elephants than others. Only the experience of the

employer or manager and the availability of the right mahouts permit the best pairs.

**Responsibilities of the mahout.** A mahout is expected to control peacefully his elephant and not use cruel methods (see Cruelty to elephants). His duties include to water, scrub and feed adequately his elephant (see related chapters). While working, he should make sure that the safety of the animal and people is not put at risk. He should make sure that the elephant is in good health; oil its feet, head, stomach and tail; treat minor injuries or ailments (See Basic health care). If any serious or unknown problem is detected, he should at once inform the officer in charge/owner or the veterinary doctor. Sometimes, mahouts use archaic and dangerous treatments such as old battery acid as an antiseptic, or drug the elephants with opium or cannabis. They also pull hair from the tail of elephants in order to sell them. All such practices should be discouraged.

A mahout should know the diet of elephants and identify trees and plants that are good or harmful for elephants. He or his assistants (*kawadi*, grass-cutter) should be capable to climb trees and cut adequate fodder without killing the tree. He should keep track of the stock of supplement ration and report to his officer/manager before the stock is exhausted.

Mahouts are responsible for the manufacture and maintenance of equipment such as *namda*, *gaddi*, ropes, brushes, and should check the condition of chains and harnesses regularly. They should keep the *pilkhana* or shelter, vessels and equipment clean at all times, oil the leather parts of the harnesses, grease the steel parts against rust, keep the ropes, *namda* and *gaddi* clean and dry.

A mahout should always ensure that the elephant is safe at any time, especially in public places and on

motor roads. The use of reflectors at night on roads is compulsory in Kerala.

While in service, a mahout should know where his elephant is at any time and take immediate action, even at night if necessary, to prevent any accident.

**Training of mahouts.** No attempt at improving the condition of elephants in captivity may be successful without an adequate plan to evaluate the competence of mahouts, improve their knowledge and raise their social status. With 3300–3500 captive elephants today in India, one can estimate that about 6000–7000 mahouts are in activity. If only half of them have an average level of experience, this represents a very small pool of expertise for the future. In consequence, young men of little or no experience are given the responsibility of elephants with the sometimes disastrous results of elephants killing their mahouts or on the contrary, captive elephants becoming the victims of incompetent mahouts who use cruel methods.

Some attempts have been made in Thailand and Kerala to institutionalise the training of mahouts. However, it takes several years to adequately train a proper mahout, years during which the young men who are always of low social background need to make a living and therefore need to be paid. Experienced teachers are difficult to find, as many senior mahouts are often illiterate or not willing to share their knowledge spontaneously with others. Moreover, the training of mahouts requires practical experience in the context of an elephant camp. Therefore, the model of apprenticeship as it takes place in Forest Department camps remains valid and should be encouraged.

Mahouts who spent their childhood in and around elephant camps have acquired from an early age a

familiarity with the elephants and an intuitive knowledge of their behaviour. This constitutes the foundation of their experience. Even today, when a male child is born in a family of mahouts, he is made to touch the elephant every day as a mark of respect and familiarity. The child grows up in constant contact with the animal but only if he is deeply passionate about the forest and the elephants does he become an apprentice under his father or another member of the family. In West Bengal, sons of other forest staff serving near elephant camps or boys from nearby villages are also selected as apprentices or grass-cutters under a senior mahout. The apprentice phase continues for many years and the ones who complete this period successfully can expect to be given the charge of a mahout (Bist, pers. comm.).

While all teenagers should of course be encouraged to attend school as long as possible, those who decide to take up this profession should receive practical courses on the ecology, biology and veterinary care of the elephant that may be dispensed by visiting teachers in the elephant camps. Likewise, the practice of making elephant harnesses (*namda, gaddi*) and ropes should be revived through regular workshops organized in the camps. Moreover, a system of evaluation should be adopted in order to assess the competence of the mahouts upon hiring and at the time of promotion. The following form suggests 20 criteria that may be evaluated by competent examiners (preferably unknown to the candidates) while observing the mahout at work, during demonstrations and through interviews. Each criterion should be rated with a mark between 0 when total incapacity is observed, and 10 in the case of excellence. The total gives an overall evaluation of the mahout's experience. It is



preferable that mahouts are evaluated with the elephant that they are used to working with on a daily basis. However, the age, sex, level of training of the elephant should also be taken into account. For example, an average mahout may appear to perform better with a docile female than a good one with a freshly trained tusker. Variables, coefficients and other refinements may be brought to this proposed system of evaluation. But in any case, the personal judgement of the examiners will always remain a subjective and sensitive factor. Their knowledge of elephants' upkeep and their impartiality are of utmost importance. The profession of the mahout is often tarnished by the examples of its worst representatives. But it should be kept in mind that it is a difficult job—therefore, the principle of evaluation should not aim at penalizing mahouts but rather at stimulating them so that they may usefully contribute to the management of elephants in captivity. Promotions and increments in salaries should be granted based on the results of such evaluations and not only on the basis of years of service, as it is presently the case. Thus, the notion of merit may reappear among this community. Finally, mahouts who have undergone a satisfactory period of training should be given a professional certification in order to protect this profession and enhance its status.

MAHOUT EVALUATION FORM		
Name of mahout:		
Age:		
Years of experience/training:		
Result of previous evaluation if any:		
Name, sex and age of elephant:		
Place and date:		
N°	Evaluation criteria	Marks
1	Tracking the elephant in the forest	
2	Identification of trees eaten by elephants	
3	Tree climbing	
4	Washing/scrubbing the elephant	
5	Swimming	
6	Handling the elephant by tactile commands only (Feet, cane, ankush.)	
7	Handling the elephant by verbal commands only (From the ground. No contact.)	
8	Phadha kas harnessing	
9	Namda-gaddi harnessing	
10	Kati-collar harnessing	
11	Making of cane & shaft of ankush	
12	Making of brushes	
13	Making of namda-gaddi	
14	Making of hemp ropes	
15	Basic health care	
16	Care of musth elephant	
17	Care of pregnant elephant	
18	Care of calf	
19	Training of calf	
20	Training of captured elephant	
	TOTAL	
Notes:		
Name and signature of examiner:		

## 7. Health care

**Indications of good health.** An elephant in good health shows the following signs:

- The eyes are clear, bright and moist.
- The palate, tongue and internal lining of the trunk are of a healthy pink colour, as well as the patches of depigmentation on the trunk, the ears and the neck,
- The animal is never still, but is continually swinging its trunk and tail, flapping its ears and rubbing one leg against the other.
- The skin is soft and wrinkled, dark in colour, and has no appearance of glaze along the side of the spine, or on the hips. The hair is stiff, pliable to the touch and not brittle.
- There is a damp line around the root of the nails. This may not show on all four feet and may vary from day to day.
- The appetite is good and the general impression is one of contentment.
- The urine is copious in quantity, clear and of a faint yellow colour.
- The dung is brownish in colour, darkening on exposure to the air. The colour may vary considerably according to the fodder eaten. It is passed in large lumps, which are fairly firm.
- A healthy elephant only lies down once or at most twice during the night and never during the day.

**Physiological parameters.** The normal rectal temperature of an elephant is 96.6°F (35.9°C).

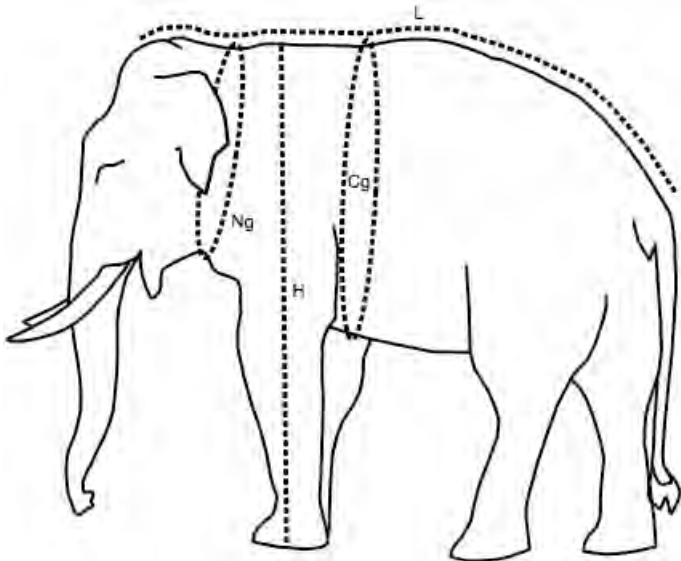
Respiration: 10 times per minute while standing, 5 times in recumbency.

Heart Pulse: 28 beats per minute while standing, 35 beats in recumbency.

**Estimation of height.** The circumference of one front foot multiplied by two gives an approximate height of the elephant.

$H = CFF \times 2$  (H = height in cm; CFF = circumference of front foot in cm)

The height of an elephant is taken at the shoulder. A more accurate method to measure the height is done with a straight stick placed horizontally on the elephant's shoulders with both front feet together on flat ground. A straight pole held vertically is used to measure the distance between the ground and the stick.



L = Body length from the top of forehead to the base of tail.

H = Height at shoulder.

Ng = Neck girth.

Cg = Chest girth.

**Estimation of body weight.** In the absence of a weighbridge, various mathematical formulas have been designed to estimate the weight of an elephant based on several body measurements: the Neck girth (Ng); the Chest girth (Cg) measured just behind the

forelegs; the body length (L), measured from the base of the forehead to the base of the tail. All measurements are done in centimetres and the weight is obtained in kilogramme (kg).

$$1) \text{ Weight} = 8.2 C_g + 18.4 N_g - 3927$$

(Ananthasubramaniam et al. 1982)

$$2) \text{ Weight} = 12.8 (C_g + N_g) - 4281$$

(Cheeran, 2000)

### Dentition of Asian elephant.

— Two upper incisors, called *tusks* if they are large or *tushes* if they are small like in *makhnas* and females.

— Six molars on each side of the jaw. Each molar wears out and is replaced by another molar growing from behind towards the front of the mouth. The number of ridges present on the molar gives an indication of the age.

Chart 7: Age of appearance and replacement of molars

Molar	Ridges	Age of Appearance	Replacement Age
1	4	4 months	2–2½ years
2	8	6 months	6 years
3	12	3 years	9 years
4	12	6 years	25 years
5	16	20 years	45–50 years
6	24	40 years	Lasts up to 80 years

Source: Roth, V.L & Shoshani J. Zool. London, 1988

**Estimation of age.** The height and dentition are two important parameters to evaluate the age of an elephant. The accurate examination of the molars may not be easy on a live elephant, but the circumference of the tusks (at gum point) may be measured easily on captive tuskers. The following chart puts these different parameters in relation and is useful to estimate the age of an elephant or, in

contrary, when its age is known, to estimate quickly the weight of the animal according to its height, which is necessary to decide the dosage of medication or vaccination.

Chart 8: Age and growth parameters in Asian elephants.

Age (years)	Height (cm)		Weight (kg)		Tusk Circ. (cm)
	Male	Female	Male	Female	
0	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	1130	810	11.9
6	190	177	1340	930	13.8
7	198	183	1540	1055	15.7
8	205	188	1730	1180	17.4
9	212	193	1900	1300	19.0
10	217	197	2065	1415	20.5
11	222	200	2200	1525	21.9
12	225	203	2320	1635	23.3
13	228	206	2400	1735	24.5
14	231	209	2500	1830	25.7
15	235	213	2645	1925	26.8
20	250	228	2970	2300	31.3
25	262	234	3400	2560	34.6
30	268	238	3650	2740	37.0
40	272	240	3800	2930	40.0
40+	274	240	3900	3000	43.4

Source: The Asian Elephant; Sukumar, 1989

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

**Trimming of tusks.** Though this is a common practice, it is not necessary to trim the tusks of an elephant, except in a few specific cases:

— If a wild male freshly captured repeatedly attempts to hit the mahouts and *koonkie* elephants with its tusks.

- If the tip of the tusk is split or broken.
- If an abnormal growth of the tusks hinders the movement of the trunk and the body.

Care should be taken not to cut the nerve canal located inside the tusk, which would be extremely painful and may cause an infection (see Decay of Dental Pulp). Before cutting, measure the distance between the lower corner of the eye and the base of the tusk at gum point. Then measure the same distance on the tusk from the base towards the tip. This point is the shortest the tusk may be cut (see Plate 8). The elephant has to be tied for such an intervention. It should be undertaken under the supervision of a specialised veterinarian. Likewise, if a tusk is accidentally broken and the nerve canal open, a veterinarian should be called at once for adequate treatment. Remember that the trade of ivory is illegal in India and many other countries. In Kerala, trimming the tusks and keeping the ivory require the prior permission from the Chief Wildlife Warden.

**Musth** is rather a sign of a healthy elephant and corresponds to a rise in the level of the testosterone hormone in the blood. Optimum seasonal, biological, social and environmental factors induce *musth*. It is characterised in males by a swelling and discharge from the temporal glands, frequent erections of the penis, dribbling of urine and aggressive behaviour. Secretion of temporal glands is sometimes seen on females. Typical *musth* occurs among most males over 18–22 years of age and up to 65 years with an annual periodicity of three weeks to three months, mostly in winter and during the monsoon. Some mahouts use drugs like cannabis or opium, starve or excessively beat their elephant or use spears (*ballam*) with metal points in an attempt

to control the effect of *musth*. This should be stopped at once. In any case, *musth* elephants should be kept in a peaceful place with adequate restraint and careful handling. They should not be made to work or drugged unless under the prescription of a registered veterinary practitioner. Some experienced mahouts can identify the onset of *musth* a week or more in advance by observing subtle changes in the animal's behaviour. Elephants in *musth* should not be used in any procession or public places.

**Basic health care.** As a rule, elephant owners or managers should keep and update methodically a service or health register for each elephant (see Service Register). They should also implement strict measures of prevention as most ailments may be prevented or cured if taken care of at an early stage. Here is a list of simple measures.

- Keep the elephant camp or enclosure clean and dry. (Daily).
- Disinfect enclosure and burn dung. (Weekly)
- Keep equipment dry and clean. Change rusty buckets and metal equipment. (Check at each use)
- Keep cattle and dogs away from elephants. (Permanently)
- Use clean water for watering and bathing. (Daily)
- Wait for elephant to cool off after work before watering or bathing.
- Use clean, healthy and balanced fodder. (Daily)
- Check that the elephant is not under or over fed. (A liver stimulant may help in the assimilation of food. Liv52, an Ayurvedic formula, gives good results at 50g per day for a month or two).
- Check health condition of mahouts. (Once yearly and at any sign of illness, especially tuberculosis)
- Ensure that elephants are not overworked. (Daily)



— Ensure that elephants have sufficient exercise. (Daily)

— Do not keep elephants in the sun. (At any time)

— Inspect the elephant dung for worms, constipation and diarrhoea. (Daily)

— De-worm elephants as soon as worms are noticed in the dung, about 3 times a year. (One 1.5 g Fenbendazole bolus for every 400 kg body weight. Not to be used for gestating and lactating elephants unless severe infestation. Check with your vet.)

— Tie tethering or drag chain to alternate feet weekly.

— Check the condition of elephant's feet. (Daily) Remove embedded stones, thorns, and treat with oil or medication.

— Irrigate or syringe wounds and abrasions with 1/1000 potassium permanganate solution; disinfect with povidone-iodine solution; apply *turmeric* powder or antiseptic paste (e.g. Himax); apply *Neem* oil around the wound to repel flies. (Daily, until complete healing). Maggots should be killed with naphthalene balls powdered and plugged in the wound for 2–3 days.

— Check temperature if any doubt on the elephant's health. (At any sign of illness)

— Call the vet if any infection, rise in body temperature, loss of appetite, loss of weight, change in sleeping pattern. (Immediately)

**Service register of elephants.** A service or health register is a record of all information that can be of use for the proper care of an elephant. One should remember that some minor events in the life of an elephant may be of great importance at a later stage and should be brought to the attention of the veterinary doctor.

The register may be simply hand written in a hard cover note book, one per elephant. The first few pages include all the known facts at the day of acquisition of the animal, and the subsequent information entered chronologically in the following pages with the date for each entry.

The service register should be maintained in the office of the owner, manager or director of the camp, temple, circus, zoo, etc. to keep the history of each elephant. It should contain the following information:

- Name of the elephant
- Sex
- Date of birth, even if approximate
- Date of acquisition
- Place of origin
- Name of father and mother, if known
- How obtained
- Marks of identification
- Copy of ownership certificate issued by the Chief Wildlife Warden
- Height at shoulder, neck girth and chest girth (to be recorded every year)
- Exact weight if a weighbridge is available nearby (to be recorded every year)
- Length and girth of tusks to be recorded every year (Note: the length should be measured from the gum point to the tip of the tusk along the outer curvature. The girth measurement should be made at the gum point.)
- Sanctioned daily scale of ration
- Training
- Temperament
- The names of mahouts and kawadis from time to time
- Posting of elephant
- Ailments and prescriptions

- Vaccinations (including details such as dose, type and batch number of serum)
- Special rations prescribed
- Date of covering
- Date of calving
- Remarks of the officer in charge and veterinary doctor

The elephant's service register should always be kept up-to-date by making necessary entries from time to time on the spot.

When an elephant is transferred from one place to another, the register should be transferred along with the elephant.

The transportation of private elephants requires a 'transit permit' from the Divisional Forest Officer or Deputy Conservator of Forest.

**Vaccination.** Elephants' owners and managers should enquire with local veterinary officers about the prevalence of contagious diseases in the concerned area, especially regarding anthrax and haemorrhagic septicaemia (often referred to as HS) that are both fatal for elephants. Any case should be reported immediately to the local veterinary officer and Forest Department. Vaccination alters the natural immune system of elephants and therefore should be practiced only when necessary.

**Specialised veterinary doctors.** Very few veterinary doctors have an overall understanding of the biology of the species in the wild. Medication, vaccinations, interventions, drug immobilisation, surgery should be carefully selected considering the fact that the elephant is a wild animal and its physiology is different from that of domestic animals. Better management and daily care reduces the need for the intervention of a vet to a great

extent, but all elephants should be examined regularly.

A few practitioners, however, have developed a passion for elephant health care. Elephant managers and owners should ask the Forest Department about such specialists so that in the case of an emergency, they may know in advance who to call for assistance.

**Symptoms of illness.** To a great extent, the symptoms of illness are the exact opposite of the indications of good health.

— The eyes are dull and sleepy, the eyelids droop, and there may be excessive watering.

— The palate, tongue and internal lining of the trunk lose their healthy pink colour. If no fever is present, these parts are pale and anaemic. If fever is present, they will be redder than usual. Light blotches on the trunk, ears and neck will be similarly affected.

— The animal is listless and moves its ears and tail much less than usual, and in a tired and dispirited manner. It stands rather pitifully and seldom moves its legs.

— A change in the sleeping pattern of the elephant is noticed.

— The skin is paler and drier than usual, and in case of severe debility may be harsh and scaly. The skin temperature in different parts of the body is variable.

— Sweating round the toe nails is absent or greatly reduced.

— The appetite is poor, except in the case of *surra*, a disease that does not affect the appetite.

— A loss of weight is noticed.

— The urine decreases in volume, may be darker in colour, and offensive in smell.

— The bowels are affected, and an examination of the dung reveals that the fodder has not been

properly digested. There may be constipation, or worms may be found in the dung.

— A temperature exceeding 98°F (36.6°C) is a certain sign of illness. A temperature of 100°F (37.7°C) denotes a very serious condition, though elephants do sometimes develop temperatures of 104°F (40°C) and recover. In every case of suspected ill health, the temperature of the elephant should be taken, and if found higher than normal, the elephant should be segregated and a specialised veterinary doctor should be called at once. To check the temperature, use an infrared thermometer on the tongue or a digital thermometer at the corner of the lip, in the rectum or in a freshly voided dung bolus. Avoid glass/mercury thermometers that may break.

**Diseases of elephants** have been the subjects of treatises since antiquity, among which the *Hastyayurveda*, attributed to Palakapya (circa 700–400 B.C.) in Sanskrit, and the illustrated *Hastividya* (1734 A.D.) of Sukumara Barkath (also known as Kaystha) in Assamese (Choudhury, 1976), should be cited. During the British time, G.H. Evans' *Elephants and Their Diseases* (1910), G. Pfaff's *Reports on the Investigation of the Diseases of Elephants* (1940) and A. J. Ferrier's *The Care and Management of Elephants in Burma* (1947) were milestones in the development of veterinary care of the Asian elephant. The following paragraphs are based on *Common Diseases of Asian Elephants* (1995) by K. Chandrasekharan, K. Radhakrishnan, J.V. Cheeran, K. N. Muraleedharan Nair and T. Prabhakaran, with further information and advice provided by B. C. Chittiappa, as well as other sources. **For correct diagnosis and treatment of infections or injuries, for minor or major surgery, always refer to a veterinary doctor.**

**Anthrax** is an acute and fatal disease due to a bacterium *Bacillus anthrax* forming spores that can live for years. The disease occurs in three forms.

1) Respiratory form with symptoms such as shivering, high body temperature, bleeding from the nostrils, swelling behind the jaws, between the limbs, in front of the shoulders, on the belly and hindquarters, staring eyes, swollen trunk and weakness of hindquarters.

2) Intestinal form. Symptoms: colic pain, diarrhoea with blood, bleeding from anus, vulva, mouth and nostrils. Death occurs in 2–24 hours.

3) The cutaneous form is characterised by small eruptions in the skin that rupture and bleed.

In the case of anthrax, there is bleeding from all orifices and the blood does not coagulate.

Treatment: Terramycin and penicillin at the rate of 8000 units per kilo body weight. Prevention: Anthrax spore vaccine by subcutaneous injection with the following dosage:

Chart 9: Doses for vaccination against Anthrax.

Age of elephant	Dose
2–5 years	1 ml
5–10 years	1.5 ml
10–15 years	2 ml
15–20 years	2.5 ml
over 20 years	3 ml

Vaccination against anthrax should be avoided for elephants below the age of 2, or if they are weak, debilitated, pregnant, or in old age. In the case of an outbreak, contaminated elephants should be segregated immediately and all healthy elephants in the area should be vaccinated at once. Owners and managers should be in regular contacts with local vets for information. Most manuals advise yearly vaccination against anthrax in Northeast India and

Burma. To prevent contamination, the carcass of an elephant that dies of anthrax should not be opened for post-mortem nor buried but burnt completely, including the tusks, immediately after examination by the veterinary doctor.

**Arthritis.** Elephants are susceptible to different types of inflammations of the joints, contusion due to fall, hitting by a log, ill treatment by mahouts, extensive periods of chaining, overweight, and rheumatism. Symptoms: pain on movements, dragging tendency of legs, oedematous swelling of joints. The elephants exhibit an inability to bear its body weight. Sometimes, the trunk is used to support the body. Treatment:

1. Intramuscular injection of analgesics like Novalgin (60–90 ml).
2. Intramuscular injection of anti-inflammatory drugs (Esgipyrin 60–90 ml, Artisone-s 90 ml).
3. Intramuscular injection of diuretics (Laxis 40 ml).
4. Intramuscular injection of antibiotics (Dierysticin 8–10 large doses or Ampicillin 10–15g or Crystalline penicillin 40–60 million units).
5. Intramuscular injection of corticosteroids (Betnesole 80–100 mg, Dexona or Hostacortin H).
6. Oral administration of anti-rheumatic drug.
7. External application of counter irritant like Iodine ointment or Icthmol glycerine.
8. Exposure to infrared rays of the affected area.

**Corneal opacity** is due to a deficiency in Vitamin A or an injury. Cases of mahouts hurting the elephant's eyes with the *ankush* are common. Symptoms: Discharge from the eyes, whitish patch or ulcer on the cornea and defective vision. Treatment:

1. Eyewash with a saline solution.
2. Application with Dionoresolvent cream.

3. Sub-conjunctival administration of Placentrex at 2 ml on alternate days for three weeks.
4. Vitamin A supplement.

**Cutaneous filariasis** is characterized by nodules of 1–2 cm in size, on the side and or the abdomen of the elephant caused by filarioidea worms: *Indofilaria pattabhiramani* or *Indofilaria elephantis* (Chandrashekaran et al. 1972) The nodules rupture one to two days after appearance, oozing blood for about 10 seconds interval for about 30 minutes. Later the nodules become fibrotic and new ones appear. Treatment: Anthiomalin at 50 ml per 2000 kg body weight. Deep intramuscular injections in the hip region at weekly intervals for 6–8 weeks. Application of Phytolacca ointment on the nodules.

**Decay of tusk (dental) pulp.** The tusks of elephants are modified incisor teeth and have dental pulp extending about 2/3 of its length. Accidental injuries during work or cutting the tusk too short may lead to infection and consequently to pulp decay. The root of the tusk may be shaky; the tusk loses its normal colour, does not grow, and may produce a hollow sound when tapped. If shaky, the tusk has to be extracted after tranquilising the elephant.

**Elephant pox.** Symptoms: Swelling on head, trunk, and lower abdomen. Eruption of pustules on the mucous of the mouth, the tongue, the trunk, ears and abdomen. Treatment: pain relievers like Novalgin and an application of Phytolacca ointment.

**Foot rot** or Pododermatitis is very common amongst captive elephants especially in intense captivity (see Zoos) due to unhygienic enclosures and long periods of chaining on dung, urine and decaying food.



Symptoms: appearance of black patches between and above the nails, dead skin that sloughs off leaving ulcers or granulating wounds. Excess granulation of spongy tissues that bleed at the slightest provocation. Treatment:

1. Clean the footpad in 1/1000 potassium permanganate solution.
2. Antiseptic footbath in 1–2% formalin or Gentian violet.
3. Cauterisation with copper sulphate.
4. Foot dressing with Triple sulphate mixed in *neem* oil or Wakazol lotion to be applied.
5. Intramuscular administration of streptomycin and arsenicals.

**Gastric myiasis** is caused by the maggots of the fly *Cobboldia elephantis*. Symptoms: Dullness, anorexia, colic and loose motion. Treatment: Tetramisole hydrochloride at 4 mg per kg body weight administered orally.

**Gastro-intestinal helminthiasis** (infestation with parasitic worms): Many types of worms affect elephants. For identification, a dung sample has to be given to a lab for microscopic examination. Symptoms: Worms appear in the dung, anorexia. Treatment: Fenbendazole boluses at 1.5g per 400 kg body weight with a repeat after 3 weeks. For tapeworm, double the dose. Other treatments exist for specific worms.

**Haemorrhagic septicaemia (HS)** or Pasteurellosis is caused by a bacterium called *Pasteurella multocida* that is either ingested or inhaled. In its acute form, the symptoms are: bluish tongue, prominent swelling of facial region, bleeding from the mouth and the nostrils, high body temperature,

and death occurs between 3 and 36 hours. In its chronic form, the symptoms are a loss of appetite, frequent yawning, contracted trunk, trembling, high temperature, swelling of the throat extending to facial region, increased respiration followed by difficulty of respiration, noisy respiration, convulsions and death due to hypoxia (suffocation). Diarrhoea is noticed with mucus and traces of blood, staggering gait and weakness of hindquarters. In peracute cases, the animal may die without showing any external symptoms, which can only be confirmed by post mortem and lab findings.

Treatment: On examination of blood discharge from the mouth or nostrils, administer 200–250 g of Sulphadimidine antibiotic orally and 800 ml by intra-venous injection, followed with half the dose for 5–6 days. Prevention: HS is very common among cattle, especially in pre-monsoon and post-monsoon periods. Vaccination of elephants is recommended yearly and the site of injection is the fold of skin at the base of the tail with a booster after 6 months. The elephant should be made to sit for the injection. The skin fold will swell for 5–6 days and come back to normal within 10 days. Gestating females and calves below 6 months should not be vaccinated unless an important outbreak is declared in the area. The vaccination of cattle around elephant camps is a good measure to prevent contamination to elephants.

**Herpes.** The elephant endotheliotropic herpes virus (EEHV) causes a fatal haemorrhagic disease, attacking the cells of blood vessels, heart and similar organs among Asian elephants with a fatality rate over 80%. At least 50 cases have been reported in captivity in zoos in the USA and Europe caused by 5 species of the virus, and more than a dozen cases have been identified in the past few years in 3

different countries in Asia, including India, among captive and wild-born specimens.

The virus seems to spread from immune, otherwise healthy African elephants to Asian elephants, especially calves between 1 and 8 years of age that may not have developed anti-bodies. A small proportion of wild-born captive adult 'carrier' Asian elephants have anti-bodies, which indicates that they probably survived mild infections when young. However, the disease is sporadic, not epidemic or zoonotic (transmitted from animals to humans).

Symptoms: Very sudden onset and rapid development within 5 days; lethargy, anorexia; oedema of head, neck, trunk, thoracic limbs; cyanosis, ulceration of the tongue; decreased red blood cells, white blood cells, platelets; tachycardia.

Diagnosis: The National Elephant Herpesvirus Laboratory (NEHL) at the Smithsonian National Zoological Park in Washington carries out diagnostic PCR (polymerase chain reaction) blood tests for suspected EEHV cases worldwide. The NEHL also collaborates with laboratories in Thailand, Cambodia, Sri Lanka and India.

Treatment: Afflicted young elephants usually die very fast, in several cases within 24 hours after the first signs, but there are 6 confirmed examples of cures in the USA in which infected calves with positive PCR blood tests survived after an early treatment with famciclovir (500 mg/70 kg body-weight + supportive, 3-4 weeks). However, this expensive drug treatment has failed in many cases.

Prevention: No vaccine or methods of control of the disease are available at this stage of research. The cohabitation of African and Asian elephants should be avoided as well as exposures of juvenile captive Asian elephants with wild born Asian elephants.

(Montali R.J., Richman L.K., Mikota S.K. et al. 2001 and Hayward G., Latimer E., Richman L., Olson D. 2009)

**Impaction of colon** is very common in elephants. The very long colon may be impacted with one or more masses of fibrous food materials weighing 50–60 kg and sometimes up to 100 kg. Often, it is caused by the tendency of mahouts to feed and water elephants immediately after a long strenuous walk in the hot and humid season when the animals are very hungry and thirsty. Other causes maybe a low water consumption and diseases of the teeth. Symptoms: colic, the animal stops drinking and eating entirely. Death may occur due to rupture of the colon and subsequent peritonitis. The most frequent duration from the onset till the large mass is voided or removed manually from the rectum is 20–30 days. Treatment:

1. Analgesic and anti-spasmodic (Novalgin or Beralgan 60–100 ml, intramuscular)
2. Antihistamine (Avil 70–100 ml, intramuscular)
3. Drug acting on smooth muscles (Calcium pantothenate 50–70 ml, Perinorm 50–60 ml, Calcium borogluconate 450–900 ml, intravenous)
4. Antibiotics Chloromycetin succinate 10–20 g or Ampicillin 10–15 g, intravenous)
5. Parasympathetic stimulants (Carbachal 5–10 mg or Prostignin 3–4 mg intramuscular)
6. Electrolytes and dextrose saline. Dextrose solution (15–25 litres, intravenous)

**Louse infestation** caused by *Haematomyzuz elephantis* (Raghvan et al. 1968, Chandrasekharan et al. 1972). Treatment: Organophosphorus compound (Sumithion) at 1% strength as a wash or dip.

**Papillomas or warts** are caused by viruses called papillomaviruses. Several hundred species have been identified infecting all mammals, including elephants with little evidence for inter-species transmission (Nicholls & Stanley, 2000). Infection causes small benign tumours, known as papillomas or warts on the trunk, the lips, the head and the ears of elephants. No vaccine is available at this stage for elephants although successful efforts have been made for bovines and dogs. Cases have been reported mostly on elephant calves and may be due to a deficiency of the immune system after weaning when the calf is deprived of its mother's milk. The warts should not be treated externally or removed as it causes further multiplication of warts. A supplement of multivitamins and minerals added to the daily ration helps in restoring the efficacy of the immune system and the warts disappear naturally within 2 years. As prevention, the supplement may be added to the ration a few months before weaning so that the calf is habituated to its taste.

**Poisoning.** It sometimes happens that an elephant suddenly dies with no other symptoms of anthrax except for the blood oozing from all orifices that does not coagulate. A blood sample should be taken and sent to a laboratory to identify the poison.

**Sunburn.** In the studied cases, the cause was attributed to the photosensitivity of a phenothiazine derivative: acepromazine. In all cases, the burn lesions were noticed after the administration of acepromazine along with xylazine. The lesions were noticed on the head dome and the backbones. The conditions were treated with antibiotics and external application of antiseptic ointments.

**Surra** or Trypanosomiasis is caused by a parasitic protozoan called *Trypanosoma evansi* transmitted by biting flies. Symptoms: intermittent fever, anorexia, anaemia, incapacity to carry out heavy work. Death is generally due to anaemia and dehydration. Treatment: 2–3 weekly intramuscular injections of Berenyl at 5–8 mg per kg body weight or Antricide methyl sulphate at 3–5 mg per kg body weight by subcutaneous injections.

**Tetanus.** The typical characteristics are locked jaws (fully or partially), inability to drink or swallow salivation, impaired appetite leading to stiffness of limbs, paroxysms and jerky movements of muscles. Treatment: anti-tetanus serum (250,000 units), muscle relaxants (Diazepam 250 mg), antibiotics (Crystalline penicillin 450,000 units), and intravenous infusion with electrolytes and glucose repeated on succeeding days.

**Tuberculosis (TB)** is an infectious bacterial disease caused by a mycobacterium, *M. tuberculosis* or *M. bovis*. It may be transmitted from elephants to humans or to other species and vice versa. One study shows that 15% of captive elephants in southern India suffer from tuberculosis, mostly in temples (Cheeran, 2008). The early symptoms are rapid exhaustion, reluctance to work, breathlessness, anorexia, weakness, cough and discharge from the trunk, although infected elephants may not show clinical signs suggestive of TB. All elephants should be tested for TB before translocation. Diagnosis can be made by culturing mycobacteria from the trunk of the elephant. This requires a ‘trunk wash’ with saline inserted in one or both nostrils and collected. One alternative is the recent Elephant TB STAT-PAK Assay, a screening test using multi-antigen print

immuno assay (MAPIA). The test uses serum, plasma or whole blood samples and gives a positive or negative result within 20 minutes. However, it provides only indirect evidence of infection and has shown variable results in some cases.

Treatment:

1. Isoniazid 5 mg/kg body weight administered orally or rectally.
2. Rifampin 10 mg/kg body weight, orally.
3. Pyrazinamide 30 mg/kg body weight, orally or rectally.
4. Ethambutol 30 mg/kg body weight, orally.

The treatment covers a period of one year. First, a combination of any 3 drugs from the list above should be administered for 2 months. Then, a combination of any 2 drugs from the list should be administered for the remaining 10 months. The treatment is expensive and shows side effects such as weakness, anorexia, consumption of earth or sand. (Further reading: Fowler & Mikota, 2006)

**Reproduction.** The age of sexual maturity of Asian elephants is usually considered 14–15 years for males and 12–14 years for females (College of Veterinary and Animals Sciences, Kerala, 2000). The average age at first calving in the wild is 18–20 years (Sukumar 1989) and 3–5 years earlier in zoos where cases of females calving at the age of 8 or earlier have been reported (Clubb & Mason, 2002). In Vincennes zoo (Paris, France), Kaveri, born on the 28.01.1984 delivered a calf on the 31.03.1990 at the age of 6 years and 2 months (Renvoisé, pers. comm.). Indira, in Kalhalla camp (Nagarahole), was pregnant at the age of 6. (Chittiappa, pers. comm.). The oldest authenticated age at which a female elephant calved was by Tara at age 62 (Sukumar, 1989).

Elephants do not have a mating season. Female elephants have an oestrus cycle of 14–16 weeks and are fertile for about a week 3 times a year. Oestrus signs are not prominent in elephants. Male elephants can detect a fertile female but females may or may not accept a male, and mating does not necessarily prove that a female is in oestrus.

Free-ranging female elephants often mate with wild males in preference to captive ones. Experienced mahouts can detect marks of the male elephant's feet or tusks on the back of the female, or remnants of seminal fluid on the hind legs or the vulva.

The gestation period is 18–22 months. The inter-calving period ranges from 2.5 to 3.5 years minimum. The average breeding rate of elephants in the wild approaches 0.20–0.25 calves per adult female per year. That is about 1 calf per female every 4–5 years. In forest camps in southern India where captive females have a choice of males including wild males, the rate reaches 0.155 calves per female per year (Sukumar et al. 1997) that is 1 calf per female every 6–7 years. Two elephants in the Tamil Nadu Forest Department have given birth to 10 calves and two others to 12 calves each (Taylor and Poole, 1998). Only elephants with optimal physical condition and within an appropriate age class are capable of reproducing while the absence of reproduction may be related to stress, long duration of chaining, frequent shifting of animals, bad handling by mahouts, excessive body weight or malnutrition (Clubb & Mason, 2002).

**Pregnancy, delivery and calf care.** Some of the first visible physical signs of pregnancy are:

- Swelling of breasts, clearly visible when the elephant is pregnant for the first time.
- The gait becomes slower.



— Viscous fluid is secreted when the breasts are squeezed.

— Breasts tilt laterally.

During the thirteenth month onwards, it is possible to feel the foetus moving, especially when the elephant is being given a bath.

Pregnant elephants should not be put to work or harnessed up to 6 months after delivery. Even after, care should be taken that the rope of the harness does not harm the teats. It is preferable not to administer heavy medicinal treatment or to vaccinate a pregnant elephant. Such decisions should be made with the advice from a specialised vet.

The quantity of ration should be raised. A special diet of vitamins, minerals, soaked green grams, and 6–10 coconuts should be added to the normal ration before and after delivery.

Usually, no visible signs announce the imminence of delivery. If free in its movements, the pregnant elephant looks for a secluded place to deliver. In natural conditions, other females of the herd assist the delivery. At birth, the calf is enveloped in the amniotic sac that is torn by its movements and with the help of its mother. Female elephants are sometimes seen eating bits of the amniotic sac or from the placenta that comes out shortly after delivery.

Within an hour or two after birth, the calf stands on its feet, often with the help of its mother, and begins suckling for very brief periods but repeatedly.

The mother should place its front legs slightly forward to help the calf access the teats. She may be enticed to do so by a gentle pressure from the hand of the mahout or a verbal command.

Note that, as per the Wildlife Protection Act, 1972, the birth of an elephant calf in captivity should be declared in writing to the Chief Wildlife Warden.

It has been observed that a calf may suckle alternatively two lactating females, (mother and foster mother) but it may happen, especially in zoos, that a female elephant rejects its calf. In forest areas, orphaned calves may be found abandoned or lost. **An orphaned calf should not be fed bananas, coconut, cow milk, etc., as it cannot digest it, and the Forest Department should be contacted at once.** Hand rearing a calf is a delicate matter that should be handled by a specialised veterinary doctor and experienced staff.

In the case of newborn calves, the first important point is to find out whether the calf has already suckled its mother or not. One may try to make it suckle another lactating female if possible. If it does, the calf should be left to the natural care of its adoptive mother. If it does not, it is quite likely that the calf has never suckled its own mother and has not received the colostrum that is secreted by the mammary glands and contains antibodies essential to its survival. In this case, calves often develop enteritis (inflammation of the intestine accompanied by diarrhoea). If the calf has been rejected by its mother, the veterinary doctor may attempt to milk the mother (after sedation if necessary, and after administration of oxytocin, a hormone produced by the pituitary gland that causes increasing contraction of the uterus during labour and stimulates the ejection of milk into the ducts of the breasts) then hand feed the calf with the obtained colostrum. The volume of colostrum consumed by a newborn calf is approximately 2–10 litres.

When the calf has received the colostrum, the efficacy of its immune system is assured. The calf should be placed alone in a disinfected enclosure with shade, away from other animals and have minimum contact with people. The calf may be

washed with water at body temperature. Minor wounds, if any, should be cleaned with a solution of potassium permanganate followed by an application of *turmeric* powder or antiseptic ointment (e.g. Himax). Proper conditions of hygiene are essential. The keepers should wash their hands before any intervention and all utensils used to feed the calf should be sterilized.

During the first 3 or 4 days, the calf may be fed a preparation of infant milk substitute at an initial dosage of 30–40g per litre, with 30–40g of sucrose or glucose, multivitamins, minerals supplement and oral rehydration salts (electrolytes), mixed in water boiled for at least 5 minutes and cooled to body temperature (36°C), using a sterilized baby bottle or an enema can. Quantity and frequency: 1 litre × 8 times a day, every 2 hours approximately, from 6 am to 10 pm. If the calf does not tolerate the milk substitute and develops diarrhoea, the formula should be changed to another brand. Diarrhoea should be treated with Trimethoprim and Sulphamethoxazole tablets (Oryprim d.s. or Bactrim d.s.), *Lactobacillus sporogenes* to regenerate the intestinal flora and electrolytes.

Once the calf is accustomed to the preparation, the milk substitute may be progressively increased to the normal dosage (135 g per litre) during the first month.

After one month, the preparation may be complemented by rice gruel and coconut milk. The ingredients should be mixed at the time of every feeding and given at body temperature. New ingredients should be added methodically to be able to detect intolerance to a specific item.

From the fourth month, the formula may be given at longer intervals and cooked rice introduced at the rate of 2 kg per day. A bit of fresh dung from a

healthy female may be mixed in water, then filtered and given to the calf. It should also be given grass that it will take progressively, and should be dewormed at any sign of infestation. Between 6 months and 1 year, the formula should be gradually reduced and replaced by a supplement ration (see chapter on Feed). In any case, hand-fed calves grow slower than breast-fed ones.

In normal situations, the calf feeds exclusively on its mother's milk for 3–4 months. It also eats bits of its mother's dung that contains anti-bodies and enzymes that help develop its immune system and its intestinal microflora. Progressively, the calf picks bits of green grass but its main source of food remains its mother's milk. In captivity, after 6 months, the calf may be given bits of coconut and should be inoculated against Haemorrhagic septicaemia (HS). Vaccination against anthrax may be considered at the age of 2 years according to the region and the advice of the vet.

**Weaning and training of a calf.** In the wild, elephant calves may be seen suckling up to 3 or 4 years of age. They are weaned naturally when the mother delivers a new calf, but remain under her care until the age of 11 or 12 years. In captivity, all calves should undergo a period of training so that they can be managed and treated safely. However, a calf should not be weaned before the age of 2 years as the deprivation of its mother's milk may compromise its normal growth or even prove fatal. In Burma, calves are separated from their mothers and trained from the age of 4 years; they are only used for light work after the age of 6. The calf should be in good health and its vaccination up to date. The best season for weaning is just after the monsoon when the weather is dry and cool, and

plenty of green fodder is available. An experienced mahout should be put in charge of the calf and should have the authority to instruct 3–4 assistants so that they can take turns night and day during the process. Two methods are used for the preliminary training of a calf. It is either placed in a *kraal* or a *crush*, or tied between two trees or poles. The first method is usually used for older elephants while the second is quicker and well adapted for a 2-year-old calf. Three new hemp ropes (1 *dole*, 2 *phan*; see Chart 6), each equipped with a loop on one end to be used in the manner of a lasso (see Plate 8), should be prepared.

The calf is taken with its mother to an open ground with some shade and a nearby source of water. Apart from the two trees or poles, all other obstacles (stones, roots, etc.) should be removed. All other elephants, dogs and cattle, should be kept away during the entire period of separation and initial training. The first rope is used as a noose and the calf is tied firmly by one of its hind legs to a tree. The second rope is equipped with a *kitta* or *phirki*—a cylindrical piece of wood, carved like a dumbbell—inserted through its fibres, at a distance that prevents the noose from tightening excessively in order to avoid all risk of strangulation (see Plate 8). The second rope is then tied around the neck of the calf and to the second tree. A fine hemp rope (*chouri*) is used to fasten the loop against the *kitta*, thus preventing the noose from opening out. The third rope is kept aside as a spare. Then, the mother is taken away. A well-trained female elephant accepts being taken away from her calf after simple coaxing by her mahouts and 3–4 helpers. Otherwise, she has to be roped by the neck and pulled away by a *koonkie* elephant. After the few first steps, she usually gives in. She should be taken several

kilometres away so that she cannot hear the calls of her calf, and should remain away for at least a month. She should be tied, fed, watered and monitored round the clock. Each morning, the mahout should milk the female elephant by gently squeezing the teats in order to prevent the engorgement in the mammary glands, which may lead to an infection. This should be repeated for four days and then every other day until the teats dry up. The calf should be monitored round the clock. During the first day, it cries repeatedly for its mother and is aggressive. Its dung becomes loose but this is temporary and does not require any treatment. The ropes should be slightly loosened from the trees during the night to allow the calf to lie down and sleep. However, it may not lie down for the first couple of nights. It may also refuse to eat or drink and this may lead to diarrhoea. If this situation persists on the third day, a specialised vet should be called immediately. Each morning, the third rope should be tied to the free back leg and the other one removed (alternating the tied leg) to reduce skin abrasions and to relax the pressure on the blood vessels and the muscles. The calf should be washed every morning with a solution of potassium permanganate. Skin abrasions should be treated carefully with iodine solution and *turmeric* powder. The ration, fresh fodder and clean water should be given twice daily, while leftovers and dung should be removed immediately. A 2-year-old calf should only be tied for a maximum of 3 to 4 days at a stretch.

On the fourth day, the calf is trained to wear hobbles and a tethering chain (See Plate 1), and then the ropes are removed. It is extremely important that the hobbles should not be too tight to avoid any serious damage to the ankles. The portion of the chain in

contact with the skin should be covered by thick leather sewn around it. *Castor* oil should be applied on the hobbles every day. The skin abrasions must be treated every day until complete healing.

During the following days, the calf is progressively trained to respond to basic commands: to move forward and backward, to lift a foot, to sit down, etc. (see Verbal commands). The mahouts should regularly speak to the calf and pat it on all parts of its body in a reassuring manner. Bananas, bits of coconuts, sugarcanes or *tamarind* are used as rewards when the calf executes a command correctly. During training sessions, the mahout may guide the calf with a flexible cane (not an *ankush*) but should never hit the elephant, especially around the eyes. The principle is not to harm the animal but to make it understand the commands. Only attempts of aggression should be reprimanded immediately by one firm hit of the cane. Soon, the gesture of raising the cane alone is enough to control the animal. The intelligence of the trainer is of utmost importance: a rough or cruel treatment may cause a severe trauma and the animal may be psychologically broken or become aggressive and unpredictable in the future. Training sessions should be supervised by the owner or officer in charge so as to control any deviation or excess by the mahouts. Thereon, the calf may be taken to a grazing area during the day and kept in the camp during the night with plenty of green fodder. Progressively, a riding rope (*phadha kas*, see Chart 6) is tied around its chest, back and tail, and the calf is trained to accept a rider (preferably a small man of no more than 70-75kg) during short sessions (1 hour twice a day). Within a month, the initial training is completed. The calf may then be brought back to its mother. It naturally resumes suckling and should let be free to

do so. However, it should be made to follow the routine of the camp, including bathing, feeding, grazing, riding, for several months until it responds steadily to all basic commands. Once again, the purpose of this initial training phase is to allow a safe management of the calf, including vaccination, not its use for any work. The next phase of training continues gradually up to maturity and will eventually enable the animal to perform specific tasks according to its age and physical capacities (see Chart 5), while the daily care will last for the entire life of the elephant.



## 8. Laws

The next four articles have been extracted from *The domesticated Asian elephant in India* by S. S. Bist, J.V. Cheeran, S. Choudhury, P. Barua and M. K. Misra (2001), and updated.

**Protection of the elephant.** The first codification of laws relating to elephants in India is found in the famous treatise on statecraft, the *Arthashastra* by Kautilya, Prime Minister of Emperor Chandragupta Maurya (300 B.C.). It stipulated the setting up of elephant sanctuaries on the periphery of the kingdoms and prescribed the death penalty for anyone killing an elephant within the sanctuary. The era of modern legislation was introduced in India by the East India Company in the 18<sup>th</sup> century. The Acts of 1879, 1912 and 1927 remained the major laws for protecting elephants in most parts of the country until 1972 (Bist & Barua, 2000).

The Wildlife (Protection) Act, 1972, (No. 53 of 1972) [WPA-1972] is at present the principal legal instrument for the protection of wild animals in India. It is applicable all over India except in the State of Jammu and Kashmir that has a separate but similar Act. In view of Section 66 (Repeal and Savings), this Act has an overriding effect over all other laws concerning wild fauna in India. This Act has also led to the formation of separate Wildlife Wings headed by a Chief Wildlife Warden (CWLW) in the states and by a Director of Wildlife Preservation at the Centre to carry out the provisions of the Act.

The WPA-1972 and its schedules were amended substantially several times, the latest in 2006. Some of the amendments have special implications for the elephant. Most of these changes were influenced by

the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) that has the Asian elephant in Appendix I. India became a party to CITES on July 20, 1976, when it became obligatory to change the legislation and the country's import/export policy to bring its provisions into conformity with those of the CITES. The Indian elephant was transferred to Schedule-I (i.e. the most protected species) on October 5, 1977. The export of the Indian elephant and its ivory from India was banned in 1978. Domestic trade in the ivory of the Indian elephant was banned in November 1986. The Act recognizes a tamed elephant both as a 'captive animal' [Section 2(5)] and a 'wild animal' [Section 2(36)]. The term 'vehicle' as defined in the Act also includes the elephant [Section 2(33)].

A summary of the provisions of the Act having a bearing on the Asian elephant is given below (Bist and Barua, 2000):

1. Sections 9, 11 and 12: Hunting (and capturing) of elephants is normally prohibited. An elephant can be hunted or captured under the orders of the CWLW if it has become a danger to human life or has become diseased or disabled beyond recovery. No elephant can, however, be hunted under this provision of the Act even if it becomes a threat to standing crops or property. The Act also permits killing or wounding in good faith of any elephant in defence of oneself or any other person. Section 11 stipulates that the CWLW should explore the options of capturing, tranquillising or translocating a problematic elephant before permission for it to be killed. The CWLW is also authorized to issue a permit for hunting or capturing an elephant, with the permission of the Central Government, for the purpose of education, scientific research, scientific management or

collection of specimens for zoos recognized by the Central Zoo Authority (CZA), public museums and similar institutions. Scientific management of elephants, as defined in the Act under Section 12, means translocation of elephants to an alternative suitable habitat, or their population management without killing, poisoning or destroying them.

2. Sections 38I and 38J: No zoo can acquire or transfer an elephant except with the permission of the CZA. Teasing and molesting captive elephants in a zoo is an offence. Recognition of Zoo Rules, 1992 framed by the Government of India under Section 63 prescribes standards and norms for keeping captive elephants and other animals subject to which the CZA may recognize or refuse to recognize a zoo.

3. Sections 40 (2) and 42: No person, without written permission of the CWLW or the Authorized Officer (AO), can keep an elephant in his control, custody or possession. The CWLW may issue an ownership certificate for this purpose.

4. Sections 40 (2) and 49: No person, without previous permission in writing from the CWLW or the AO, can acquire or receive an elephant. No person, other than a zoo recognized by the CZA, can purchase, receive or acquire an elephant otherwise than from a person authorized under the Act.

5. Section 49B (1): No person can commence or undertake business as a dealer in elephants on and after January 25, 1987.

6. Section 43(1): No person, whether possessing ownership certificate or not, can sell or offer for sale or transfer whether by way of sale, gift or otherwise, an elephant without written permission of the CWLW or the AO.

7. Section 40(2): All persons, whether possessing ownership certificate or not, should seek permission

of CWLW or the AO before transporting any elephant.

8. Section 48A: No person can accept an elephant for transportation except after exercising due care to ascertain that permission from the CWLW or the AO has been obtained for such transportation.

9. Section 50: Any forest officer or any police officer of the rank of sub-inspector or above, or any wildlife official authorized by the State Government or the Central Government can, on the basis of reasonable suspicion, require any person to produce for inspection any captive elephant or animal article (including ivory articles) or trophy (cured or uncured) obtained from an elephant in his control; or ownership certificate, licence or permit required to be kept by him under the Act. They can search any baggage, vehicle, vessel, premises or land for the aforementioned items and seize the same in case of violation of any provision of the Act. They can also seize any trap, tool, vehicle (including an elephant), vessel or weapon used for committing the offence. The offender may also be arrested without warrant.

10. Section 51: For any offence relating to elephants, or offences committed by professional dealers, manufacturers and taxidermists dealing in elephants or articles made of ivory (including imported ivory) or any other product derived from elephants, the offender can be punished with imprisonment for a term from three to seven years and a minimum fine of Ten thousand rupees. For repeated offence, the Act provides for a minimum fine of Twenty-five thousand rupees.

As stated earlier, many Forest Acts also contain provisions for the protection of elephants in the Reserved and Protected Forests. The Indian Forest Act, 1927 (IFA-1927) regards elephants as 'forest produce' and therefore requires a transit permit for

their movement from one place to another (Section 41). Similar provisions exist for elephants in the Forest Acts in the states where the IFA-1927 is not applicable.

**Cruelty to elephants.** Captive elephants in India are also subject to the provisions of the Prevention of Cruelty to Animals Act, 1960 (59 of 1960) [PCA-1960]. This Act does not define 'cruelty'. However, Section 11(1) enumerates various acts of omission and commission, which constitute cruelty to animals. Barua and Bist (1996) have listed various possible forms of cruelty to elephants that include: (a) Beating, over-riding, over-loading, torturing or otherwise subjecting any elephant to unnecessary pain or suffering; (b) wilfully and unreasonably administering any injurious substance to an elephant; (c) confining an elephant in a cage that does not permit the animal a reasonable opportunity for movement; (d) conveying or carrying an elephant in such a manner as to subject it to unnecessary suffering; (e) mutilating or killing any elephant by injecting strychnine into the heart or using any other unnecessarily cruel method; (f) not providing any elephant with sufficient food, water or shelter; and (g) inciting any elephant to fight any other animal for the purpose of entertainment. Some of the rules framed under the PCA-1960 seek to regulate such activities as may constitute cruelty to all animals including elephants. The Prevention of Cruelty to Draught and Pack Animals Rules, 1965 prohibits the use of elephants for drawing any vehicle or carrying any load for more than nine hours a day. It also prohibits the use of any spiked stick or sharp equipment for driving or riding an elephant. The Performing Animals Rules, 1973 lays down necessary procedures for registration of trainers and

exhibitors of performing elephants. The Prevention of Cruelty (Capture of Animals) Rules, 1972 prohibits the capture of animals except by the 'sack and loop' method, tranquilliser guns or any other method that renders the animal insensible to pain before capture.

**Import/Export of elephants.** Different sets of legal provisions exist in India to regulate the import and export of elephants and products derived from them. The Government of India announces its import/export policy from time to time and with regard to a particular species of wildlife and this is usually influenced by its status under the WPA-1972 and the CITES. According to the present policy (2001–2012), zoological parks, recognized scientific institutions, circus companies and private individuals can import elephants on the recommendation of the CWLW subject to the provisions of the CITES. Zoological parks, in particular, are exempted from import duty under the provisions of the Customs Tariff Act, 1975. The export of elephants, including their parts and products, is prohibited. However, in exceptional circumstances, the non-commercial export of elephants is permissible for specific scientific, zoological or educational purposes on the recommendations of the Ministry of Environment & Forests, Government of India. In 2005, the National Board for Wildlife has recommended the abolition of the practice of gifting wild animals including elephants by the Head of the Government / Head of the State. All exports and imports of elephants are permissible only through the custom points at Delhi, Calcutta, Mumbai, Chennai, Cochin, Tuticorin and Amritsar and are subject to provisions of the CITES and inspection by the wildlife authorities of the

central government. Any violation of the import/export policy is deemed to be an offence punishable under the Customs Act, 1962.

**Registration of elephants.** Prior to the enactment of the WPA-1972, there was no legal provision for the registration of captive elephants. Some timber companies used to brand their elephants for identification, but it was their internal affair. In north-eastern India, the British started a system (still in practice) of registration of *koonkies* (trained elephants) engaged by the contractors for elephant capturing operations. The registration comprises a certificate issued by the local Divisional Forest Officer containing details of height and other identifying marks of the elephant. In recent years, photographs of the mahout and *phandi* (nooser) have also been affixed on the registration papers. The registration remains valid for the period of validity of the contract and is enforceable through the clauses of the contract. In north-eastern India annual grazing permits for elephants issued by the Forest Department to the owners are also sometimes regarded as an 'identity card' for the elephant.

The WPA-1972 envisages the registration of captive elephants by way of ownership certificates. These certificates are issued by the CWLW or the AO to the legitimate owner of the elephant after due verification.

However, available information indicates that there are only about 1300–1400 captive elephants with ownership certificates in India and that accounts for about 48 percent of the eligible elephants. In Tamil Nadu and New Delhi, privately owned elephants having ownership certificates are above 80 percent. Assam is reported to have issued as many as 703 (63 percent) ownership certificates but it is doubtful that

all these certificates are in conformity with the provisions of the WPA-1972. Circus elephants are mostly covered under ownership certificates. There are many instances when Forest Officers, who feel more comfortable with the Forest Acts than with the WPA-1972, have issued transit permits in lieu of ownership certificates for elephants sold by them to persons, circuses or temples.

For these reasons, Project Elephant and CZA have initiated a programme for using microchips on captive elephants for identification. This is essential because the form for ownership certificate has not been designed specifically for the elephant and, therefore, it may not be possible to identify the elephant on the basis of the scanty information given in the ownership certificate. However, microchips provide an efficient way of identifying elephants.

**In Kerala.** In recent years, Kerala has seen an increase in the number of captive elephants (612–635 estimated in 2008) brought from other states by private owners and temples. In consequence, the Government of Kerala has found necessary to prescribe rules and procedures for the management of captive elephants, called the Kerala Captive Elephants (Management and Maintenance) Rules, 2003.

These rules are an interesting attempt to fill the gap between the Wildlife (Protection) Act, 1972, that does not provide for the management of captive elephants (except for issuing of ownership certificates and transportation permits of elephants), and the Recognition of Zoo Rules that only apply to zoos and circuses.

Among the provisions listed in the Kerala rules, mention should be made of the following:



- Compulsory training and certification of mahouts by the Forest Department.
- Medical check-up of mahouts (once in two years) for diseases transmissible to elephants.
- Minimum size of elephant tethering place (9 × 6 m for an adult elephant) with adequate shade.
- Compulsory daily bathing for all elephants.
- Compulsory check-ups by a Veterinary Doctor, including for elephants in *musth*.
- Prohibition of the use of drugs and intoxicants to suppress *musth* unless under prescription by a Veterinary Doctor.
- Control of the CWLW on surgery practiced on elephants (especially regarding sterilization and trimming of tusks).
- Control of the Forest Department on the use of elephants in festivals.
- Prohibition of the use for work of elephants in *musth*, pregnant females (over 12 months), females with a calf below six months, or any elephant below the height of 5 feet.
- Prohibition of the use of nylon ropes or chains/hobbles with spikes or sharp edges for tying the elephants.
- Obligation for the owner to report the death of an elephant within 24 hours, to get a post-mortem examination conducted by a Veterinary Doctor and to send the report to the CWLW within 15 days.
- Control of the CWLW over the ivory obtained from the trimming of tusks and the death of tuskers.
- Minimum provision of fodder and ration to elephants.
- Regulation of the workload of elephants, the methods, equipment and conditions for timber dragging.
- Regulation of the conditions of transportation of elephants either by foot, truck or rail.

— Obligation for the owner to maintain service registers for elephants including the records of veterinary check-ups, vaccinations, movements, feeding and work.

The Rules also list a series of harmful practices and treatments in order to frame the notion of cruelty to the elephants.

## VERBAL COMMANDS

Commonly used to handle elephants in India (Variations occur in different regions, especially in Kerala where Malayalam is used).

Phonetic pronunciation:	Meaning:
Aghat	Go forward
Aré Khado	Stop, stand still
Beit	Sit
Bol	Speak
Choop	Drink
Dek	Look
Dalé, Déré	Lift the trunk, take
Dat Peechché	Go back
Dhar	Hold with the trunk
Dhoom	Tail (watch your tail)
Jhook	Bend down
Lé	Take
Mar	Push
Mut, Malé	Walk, Go on
Nit	Stretch the leg
Peechché, Peechchoo	Back, behind
Salaam	Greet with the trunk on the forehead
Sarak	Move aside
Som	Lie on the stomach on fours
Tchai	Turn right
Tchi	Let go
Téré	Lie down on the side
Tol	Lift the front foot

Combinations:

Agat Malé

Burr Choop

Dhéré Mut

Hadi Tol

Jhook Mar

Som Beit

Tol mar

Walk faster

Fill (the trunk) and drink

Take and walk

Lift the back foot

Lower the head and push

Sit down on fours

Kick

## GLOSSARY

- Ankush**, ankus: Hook used to control an elephant.
- Ballam**: Spear in Urdu.
- Bandh**, bundh: Ancient 'castes' or 'breeds' of elephants according to the build or body formation (see *koomeriah*, *meergah* and *dwàsala*).
- Bedi**, beri: Hobbles in Hindi.
- Bellyband**: Leather protection for the chest in the harness of elephants.
- Castor oil**: Oil made from the seeds of the castor-oil plant (*Ricinus communis*, Family Euphorbiaceae).
- Chouri**: Small hemp rope.
- Coir**: Fibre from the outer husk of coconut.
- Crush**: Structure used to immobilize an elephant for preliminary training or veterinary care.
- Dant**: Tooth or *Tusk* in Hindi.
- Dhan**: *Paddy* in Hindi.
- Dhoomchi**: (From Hindi, *dhoom*, tail) Crupper or tail protection covered with thick leather.
- Dole**: Thick hemp rope.
- Dwàsala**, doshala, dohar: (From Persian, *dù*, two, and Arabic, *asl*, root, stock, origin) Elephant with mixed characteristics of *Koomeriah* and *Meergah*.
- Feral elephant**: A captive elephant gone back into the wild.
- Gaddi**, guddee: Saddle, usually made of jute and stuffed with dried reeds.
- Ghazbak**, gajbak: *Ankush* of wrought iron with two spikes.
- Goor**, gur: *Jaggery* in Hindi.
- Guddela** (also *namda*): Quilted saddle pad.
- Haat**: Hand in Hindi, used to designate the trunk of an elephant.
- Hathi**, haathi: Elephant in Hindi.
- Hatheni**: Female elephant in Hindi.
- Horse gram**: Type of pulse (*Dolichos biflorus*).

**Howdah:** Seat or platform tied on the *gaddi* for riding.

**Jaggery:** Coarse dark brown sugar made by evaporation of the sap of palm trees.

**Jamedar:** Chief *mahout* in charge of a whole elephant camp.

**Kati-collar:** Elephant harness for timber dragging.

**Kawadi, cavady:** Assistant *mahout*.

**Khedda:** Stockade for the capture of wild elephants.

**Kilava ka rassi:** Riding rope tied round the neck.

**Kitta:** A cylindrical piece of wood, carved like a dumbbell, inserted through the fibres of a rope to block the loop of a noose.

**Kokke, kokka:** Hook in Kannada. Small *ankush* with a wooden shaft.

**Koomeriah:** (From Sanskrit *Kumara*, youth, prince) Massive, sturdy elephant with short legs, considered to be royal, princely (see *Bandh*).

**Koonkie, kunki, kumki:** Elephant trained for the capture and training of wild elephants.

**Kraal:** Wooden enclosure where captured elephants are placed for initial training.

**Koochra:** Paddy rolled in a handful of hay.

**Mahout:** (From Hindi *Mahawat*) Elephant trainer or handler.

**Makhna:** Male elephant with very small or no *tusks*.

**Meergah:** (From Sanskrit *Mriga*, deer) Slim, long-legged, swift elephant (see *Bandh*).

**Mela-shikar:** Noosing of wild elephant from the back of a *koonkie*.

**Mundakai:** (Kannada) Wild fruit of *Pandanus unipapillatus* used to make brushes for elephants.

**Musth:** Periodical swelling of the temporal glands associated with an aggressive behaviour.

**Namda, numnah** (also *guddela*): Quilted saddle pad placed under the *gaddi*.

**Neckband**, gola-band: Leather protection for the neck in the harness of elephants.

**Neem oil**: A medicinal oil extracted from the neem tree (*Azadirachta indica*, Family Meliaceae) also called margosa.

**Paddy**: Rice with the husk (*Oryza sativum*, Family Gramineae).

**Phadha kas**: Elementary harness for riding an elephant without a saddle.

**Phan**: Noose.

**Phandi**: Nooser in *mela-shikar*.

**Phirki**: See Kitta.

**Pilkhana**: Place where the elephants are tied or fed.

**Pundi nar** (Hindi) Sanap (Kannada): Hemp fibre used for ropes (*Cannabis sativa sativa*, Family Cannabaceae).

**Ragi**: Finger millet (*Eleusine caracana*, Family Gramineae).

**Rock salt**: Halite, mineral cubic crystals of sodium chloride, colourless, pink or black.

**Sakhna**: Stout male elephant with short thick *tusks*.

**Sankal**: Chain in Hindi. Elephant drag-chain or tethering chain.

**Tamarind**: Sticky brown acidic pulp extracted from the pod of the tamarind tree (*Tamarindus indica*, Family Leguminosae).

**Turmeric**: A bright yellow powder obtained from the rhizome of *Curcuma longa* (Family Zingiberaceae) used as an antiseptic.

**Tush** (pl. tushes): Small incisor tooth of *makhnas* and female elephants.

**Tusk**: Long incisor tooth of elephant.

**Tusker**: Male elephant with *tusks*.

## **PHOTOGRAPHIC PLATES**





Plate 1

Standard type of hobbles.  
One open ring on each end is used as a lock.



Drag or tethering chain (12-14 mm steel long links.  
Length:10 m. Weight: 15 kg). Turn the hook outwards.

## Plate 2

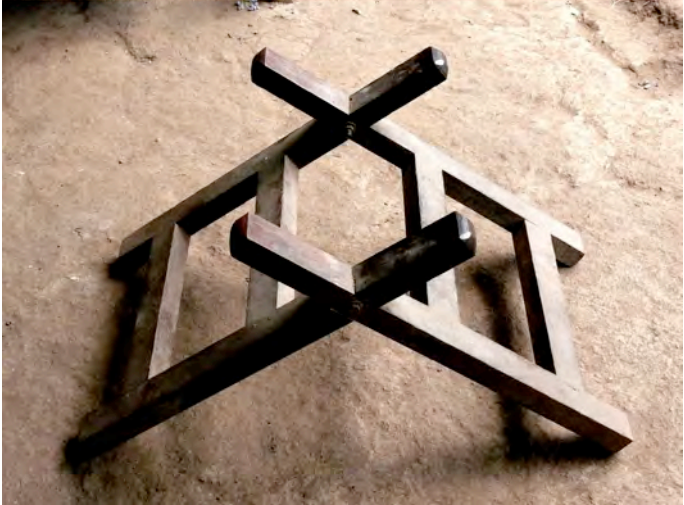
*Ghazbak* in wrought iron with two sharp points



Small *ankush* with one rounded point and a wooden shaft.  
(*Kokke* in Kannada)

Plate 3

*Dhoomchi* or tail protection covered with leather.



*Kati* made of wood.  
(Width: 95cm, Height: 50cm, Length: 55cm)

## Plate 4

*Namda*: Topside in jute, underside in cotton, stuffed with *coir*. It should be made to the size of each elephant.



Plate 5

*Gaddi*: Well stuffed with dried reeds.  
The central opening is made to fit the spine of the elephant.



## Plate 6

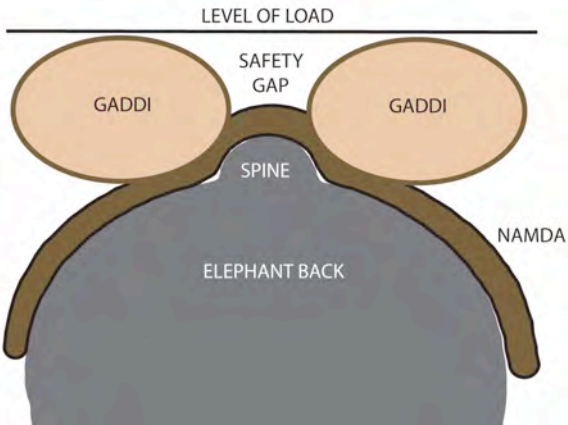
Elephant harnessed with a *namda*, *gaddi* and a hemp rope. The rope around the neck should not be too tight.



Elephant harnessed with a *kati-collar* to drag timber. The rope is not tied around the neck.

Plate 7

The *gaddi* is stuffed with reeds and remains firm.  
The tail is protected by the *dhoomchi*.



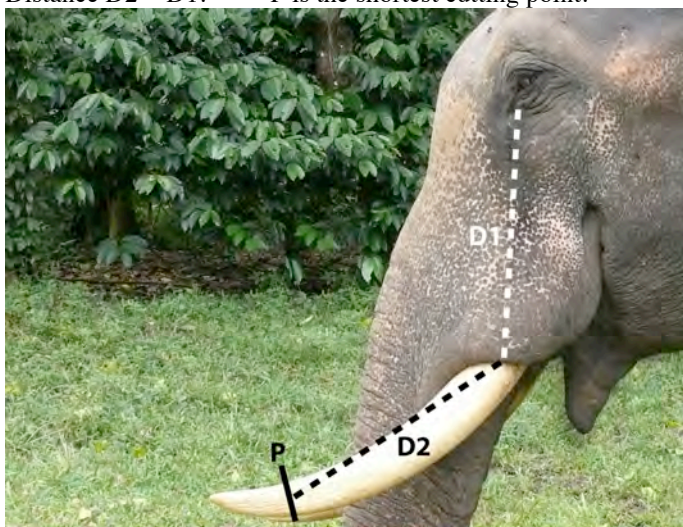
Cross-section of the back of an elephant  
harnessed with a *namda* and *gaddi*.  
The spine is protected by a sufficient gap.



## Plate 8

Safe measurement for the trimming of tusks.

Distance  $D2 = D1$ . P is the shortest cutting point.



Hemp rope with a loop (*Phan*). A *Kitta* or *Phirki*. The noose.

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# ELEPHANT CODE BOOK

As many as 16,000 Asian elephants—one third of the entire population—are captive. In India alone, about 3500 elephants live in various and often critical conditions of captivity, contradicting the contemporary notions of wildlife conservation and animal welfare.

The Elephant Code Book examines the current methods of elephant keeping and recalls the historical background that is necessary to understand the present situation. It reviews the classical texts on the subject as well as the relevant scientific literature in order to define the principles, methods and minimum standards to be adopted as a code of conduct in the management of elephants in captivity.

This text is the result of 16 years of personal experience in elephant camps and amongst mahouts in distant parts of India. Moreover, it was revised by several reputed specialists of the Asian elephant. The Elephant Code Book is intended as a handy reference tool for Forest Department officers, wildlife activists, private elephant owners, temple trustees, circus managers, zoo directors, veterinary doctors, traditional mahouts, elephant keepers and all those who can make a difference in the lives of captive elephants.

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