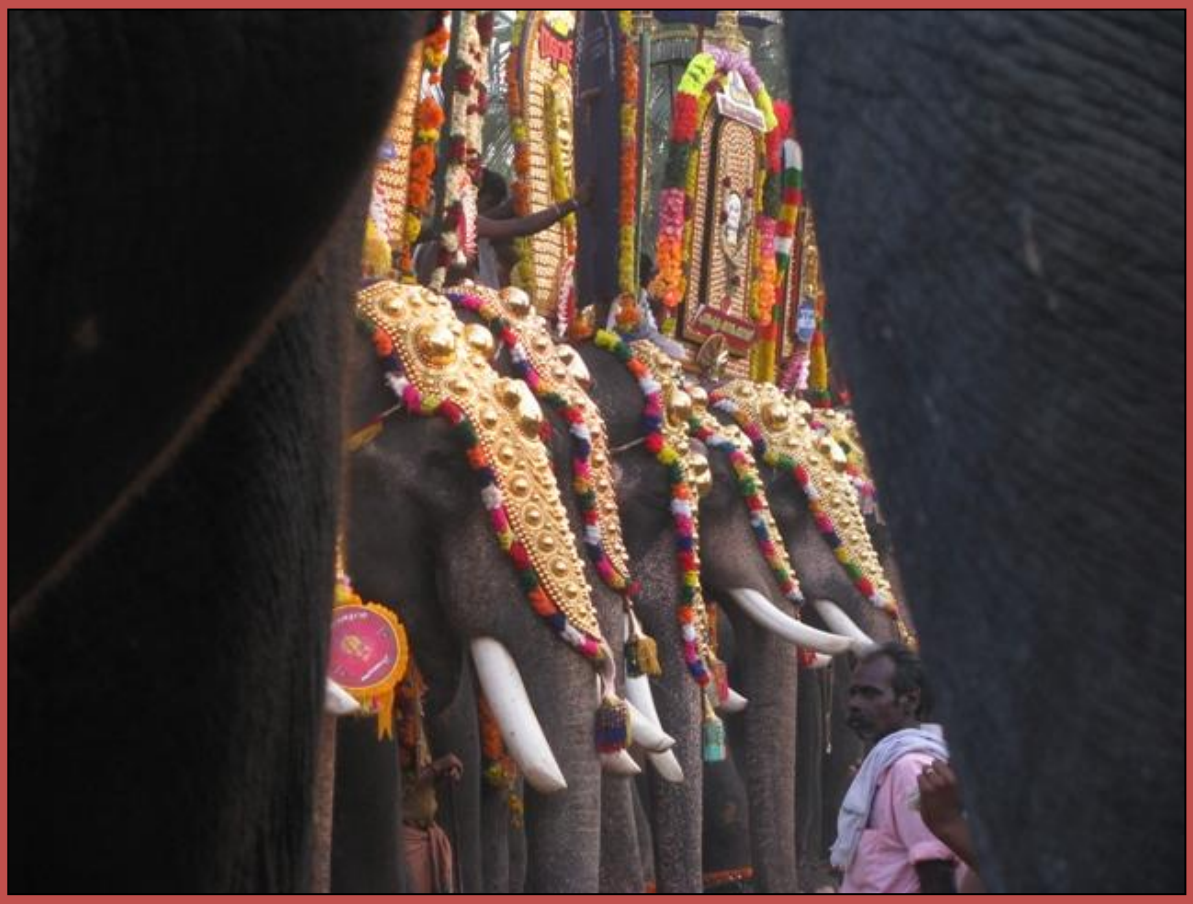
Captive Elephants in Kerala



An Investigation into the Population Status, Management and Welfare Significance

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Elephants in Captivity: CUPA/ANCF-Technical Report. 10

Compassion Unlimited Plus Action

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Appendix 1: Details of elephants obtained through micro-chipping of them in Kerala

Preface

Kerala's captive elephant population accounts for a considerable percentage (nearly 21%) of the estimated captive population in India. In the light of a low captive breeding scenario, the occurrence of large numbers of elephants in captivity implies transfer from other regions/ owners. This transfer would have to be based on sourcing elephants from the wild/ from captive bred elephants. This is borne by the fact that all the regimes showed a deviation of more than 50% from E-R for source of elephants, implying wild-caught elephants or transfer across regions.

With this background, it is a matter of concern that the number of tuskers maintained in captivity in Kerala outnumber the female elephants. This results in loss of gene pool to the wild in the absence of mating and also increases availability of raw tusks for trade. A report (Anon., 2003) by TRAFFIC India states that one of the sources of raw ivory is from the tuskers in Kerala.

Incidents of running amok and causing injury or killing of handlers or public is recorded for elephants with private owners and with temples. Incidents ascribed to these two regimes are a cause for concern for all involved. This aspect of aggression by elephants needs further study to establish the factors causing or linked to such incidents.

The document on captive elephants in Kerala is based on the data collected using two distinct approaches. An attempt was made to develop a comprehensive database of the population status, identified from different management regimes and ownership details of elephant districts across the state. This was achieved by using the information collected during micro-chipping of captive elephants in Kerala, which was conducted by a qualified team.

Using details available for individual animals, an attempt was made to ascertain the total number of elephants and their sex and age classes. The information also provided district wise ownership along with other details. We assume that this is the first ever attempt to know the actual population size of captive elephants in Kerala. The second approach for data collection was based on defining welfare conditions of the elephants in the State. This was done by comparing the living conditions of both wild and captive elephants. The protocol here is based on the deviations in living conditions of captive elephants from their counterparts in the wild.

These deviations are from a scale of 0 to 10. The value of 0 suggests that the captive elephants live in an unnatural human influenced environment and express unnatural behaviours. Following the above logic, welfare of the elephants and their mahouts' were assessed for 157 elephants, selected across different managements and districts. The data processing for the second approach of data collection was done by two distinct methods. Except for a single elephant from a circus, for all the institutions the data was analysed using expert and mean ratings. For the circus elephant, the ratings were graded. Values arrived between 0.0 and 2.4 were 'Bad', 2.5 and 4.9 was 'Poor', 5.0 and 7.4 'Moderate' and 7.5 and 10.0 was 'Satisfactory'.

The document contains 6 sections. Section 1 deals with overall population status, management and welfare of elephants in captivity in Kerala. The 1st section along with the executive summary also provides recommendations for the State. These identify the issues linked to keeping elephants in captivity in Kerala and provide state specific recommendations. In addition, a specific recommendation for each management regime is also given.

Section 2 describes the welfare status of elephants kept with the forest departments and their handlers. The forest department elephants are placed in Muthanga forest camp in Wyanad, Aryankavau, Kodanadu, Konni and Kottoor. For each location, the data was processed and subsections 2b, 2c and 2e were developed.

Section 3 identifies the welfare status of elephants kept in zoos, while Section 4 provides knowledge about elephants kept in temples. Section 5 is dedicated to elephants from the private ownership category. Section 6 attempts to understand the welfare status of elephants kept in circuses. One circus was identified that had a single female elephant. Her welfare status was assessed to create information about captive elephants in circuses. The sequence of presentation of each regime is based on the decreasing order of existing welfare standards that emerged during investigation.

Data processing was accomplished using two approaches - a rating scale developed by experts using the importance of a particular parameter for an elephant. This was used for all the sections, except for Section Six. For the latter, welfare features or parameters were rated on a zero to ten scale with zero representing extremely unsatisfactory conditions and ten implying a satisfactory state, closer to an animal's experience in the wild. This can be further sub-divided into 0 to 2.4 as reflecting, bad welfare conditions, 2.5 to 4.9 as poor, 5.0 to 7.4 as moderate and the values 7.5 to 10 as satisfactory conditions.

Within the stated regimes, the most challenging is maximizing welfare of privately owned and temple elephants with the present traditions of handling and training. Festivals in Kerala play an important role in the welfare of captive elephants and their mahouts. This implies that unless the festivals are restricted and effectively regulated, welfare laws may not work in the State.

Acknowledgements

As mentioned elsewhere, the investigation on captive elephants in Kerala is based on the data collected using two distinct approaches. The first approach was achieved by using the information collected during micro-chipping of captive elephants in Kerala. The special interest shown by the Hon. Minister for Forest and Wildlife, Kerala, Sri Binoy Viswom, The Principal Chief Conservator of Forests Sri T.M.Manoharan, the Chief Wildlife Wardens during these period Sri, Valliyil Gopinath IFS, Late Sri V.S.Varghese IFS, Sri J.K.Tiwari IFS and Sri Ouseph IFS, the limitless support of the Director of Animal Husbandry Department Dr.Vijayakumar and his team members of the different Elephant Squads were invaluable factors for the success of the microchipping programme. Veterinary experts Dr. Arun Zacharia and Dr. V.M. Abdul Gafoor and other forest officials need special mention.

The second approach for data collection was based on defining welfare conditions of the elephants in the State. Individuals who helped us in accomplishing this approach were Prof. Dr. K.C.Panicker, (Retd.Prpfessor, Veterinary College, Kerala Agricultural University), Prof. Dr. Jacob V.Cheeran (Retd.Prpfessor, Veterinary College, Kerala Agricultural University), Dr. B. Aravind, Senior Veterniary Surgeion, District Veterinary Centre, Kollam, Dr. G. Ajith Kumar and Dr. Anil K, Asociated Professors, Department of College of Veterinary & Animal Sciences, Mannuthy, Dr. David Abhram, Trichur, Mr. V.C Jayakrishnan (Mahout/School Teacher, ALPS Ponnani Ezhavathuruthi, Malappuram), Mr. P. Sasikumar (Secretary, Kerala Elephant Owners Federation), Mr. C.N. Radhakrishnan (Puthrukkovil Temple Seva Trust, Olari, Thrissur), Mr. E. Ramesh (Elephant Squad Member, Thrissur), Mr. K, Rajesh, Palaghat, Mr. M. G. Ramesh, Pravoor, Mr. Rajappan, Elephant Owner, Waynad, Mr. Vijayakumar, Mahout, Thiruvananthapuram.

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Section 1:
Status of Captive Elephants in Kerala

Executive summary

The state of Kerala was home to an estimated 612-635 captive elephants in 2000, another estimate for 2008 suggested the occurrence of 750 elephants for the state, and in 2009 it was estimated to be 702 elephants.

The range of captive conditions experienced by elephants will influence its welfare status by altered opportunities for expression of species-typical behaviours. This investigation aimed to assess the welfare status of captive elephants and the professional experience and socio-economic status of handlers in Kerala, across different management regimes,

This investigation is based on two different approaches: first is an attempt to estimate total number of elephants in the state, and based on this, to segregate elephant distribution across ownership types. The second approach is to select about 157 elephants and assess their welfare status. The welfare was assessed based on a rating scale.

The rating scale from unsuitable conditions to suitable conditions was used to assess the welfare status of captive elephants and their handlers. The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter, which is termed Experts' Rating (E-R). Mean Rating (M-R) representing the actual situation existing for the elephant/s was obtained through the ground survey. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.

The elephants were maintained by four types of regimes, Private individuals (Pvt), Temples/ ashrams, Forest Camps (FC) and Zoos, with some institutions or individuals keeping more than one elephant. Private individuals owned 508 elephants, temples had 174, forest camps had 8 and a zoo was home to 2 elephants. Among private owners, an elephant was used for performing in a circus.

Among private owners, maximum number of elephants belonged to Kottayam district (86) followed by Thrissur (50), Kollam (47). Kasargod, Kannur, Wayanad, Mallapuram and Idukki districts maintained less than 10 elephants with private owners.

For the welfare status of elephants, a total of 157 elephants were observed across five ownership types. Of these, 26 were females and 131 were male elephants. Irrespective of ownership types, it was seen that maximum number of elephants, across both sexes, was between 6- 60yrs with most males and females being in their prime age (16-40yrs). Presence of calves accounted for 12.5% of the captive female population and 1.6% of the male population. Tuskers accounted for 80% of the male population.

Among the 18 FC elephants, 56% were rescued from the wild and 33% were wild caught. Only two elephants were captive born. All the elephants with private owners had been purchased; among these 26% had been captured from the wild. Ninety nine percent of temple elephants had been purchased or received as donations; one elephant had been rescued in 1936 from the wild. A single elephant sampled from a zoo had been captured from the wild. The circus elephant had been purchased.

Among the five FCs observed, three maintained elephants for timber hauling, one was a center for *koonkies* (*kumki*) and one was a care center meant for providing rehabilitation for elephants. All private elephants were maintained for use in festivals/ processions/ religious functions/ timber hauling/ tourism related activities. The zoo elephant was maintained for display purposes. Greater deviations from E-R observed for private owners and the zoo shows commercial use in an un-natural physical environment for the elephants.

Thirty nine percent of the FC elephants were allowed free ranging opportunity for a part of the day in forest conditions; all elephants had access to natural floor, roofed shade from roof or trees. Physical space for private elephants and temples was limited to less than $1km^2$, nearly 71% and 83% of the elephants with private owners and temples respectively were kept in open type shelters, partial tree cover was available as shade, earthen floors were available for 93% of the elephants.

Circus elephant was tied in an open area with natural flooring, no shade was available. For the zoo elephant, two kinds of enclosures were available, a day shelter with earthen flooring and a night shelter with concrete flooring; total enclosure size was 2050sqm, size used by elephant was 40sqm; Partial tree cover was available in the day shelter and the night enclosure was a roofed permanent shelter. The ratings are comparable across regimes as each regime shows overlap due to variations present in the shelter conditions.

Only 22% of FC elephants did not have access to streams/ rivers as a source of water,. 83% had access to more than one water source (stream/ well-water/ tap water); all elephants were bathed at least once per day with natural materials (coir/ coconut husk).

Non-river/ stream sources (taps/ bore-wells/wells) was available for 95% of private elephants, 62% were given more than one source of water, bath frequency ranged from daily to once a week, bathing materials used were coconut husk, pieces of concrete, ceramic stones.

Seventy percent of temple elephants had ponds as water source, 15% wells and only 10% had access to rivers/ streams; Bath frequency varied from daily to fortnightly; Bathing materials were coconut husk/ pumice stone/ ceramic stones.

Tap water and pool were water sources for the zoo elephant; bath frequency was once in two days; material used for scrubbing was coconut husk.

Tap water through buckets was provided for the circus elephant. FC elephants were given relatively higher rating showing lesser deviation from E-R and consequent better welfare status for this parameter.

The ratings were comparable for all other regimes and were relatively low.

Except for an adult male in one FC, all elephants were given opportunity to interact for at least 2h per day; number of individuals varied from 3- 5 of different age/ sex. Interaction for

private elephants was possible if the owners maintained more than one elephant or when the elephants were taken for work; 68% owners (N= 19) maintained only male elephants.

Seventy six percent of temples did not provide opportunity for interaction during off-season; number of individuals ranged from 1 (off-season) to 20 (work). The zoo and circus elephants were maintained singly.

The variation in M-Rs across FCs, private owners and temples showed overlap in values implying similarity across the observed management systems.

Thirty nine percent of FC elephants were given varying durations of free-ranging opportunity in the morning; duration of chaining ranged from 12- 20h; 1m chain was used for the observed elephants. Sixty nine percent of private elephants were chained in more than one region of the body, eight percent were allowed some duration of free-ranging opportunity; chaining duration (off-season) was 18-24hrs.

All temple elephants were chained in more than one region of the body; duration was 18-22hrs; hobbles were used for 54% of the observed elephants. The zoo elephant was chained using hobbles in its day enclosure for 16h; free-ranging opportunity was not given. The circus elephant was chained for 22h; no free-ranging opportunity was provided. The M-Rs for all the observed regimes were comparable, indicating poor status across the management systems.

Eighty nine percent of FC elephants, 67% of private elephants, and 63% of all temple elephants were described as docile. Stereotypy was observed in 27% of the FC and private elephants, 56 % of temple elephants and 100% circus elephants.

No stereotypy was observed for the zoo elephant, it was described as quiet but rough towards strangers/ new handlers. Forty eight percent of temple elephants had injured/ killed public/ handlers. Comparable deviations were observed for temple and circus elephants, variation in M-R being greater for the circus elephant. Minimum deviation was observed for the zoo elephant followed by FC elephants.

Adult FC elephants were used for timber related work/ tourism/ as *Koonkies*; some were occasionally used in festivals. Private elephants were used in festivals/ timber work; 51% of the elephants were used only for festivals, 2% only for timber work and the rest were used for both kinds of work; elephants were worked throughout the year.

The zoo elephant was not given any work. Work for the circus elephant involved performing tricks in front of an audience, walking around the arena for 15 minutes per show; also used for begging from public.

FC, Private owners and temples, showed overlap due to the variation in each regime. This implies the existence of similar work conditions due to non-uniformity of standards in the features observed. No deviation from E-R was observed for the zoo elephant as it was not put to work.

Except for two FCs which provided browsing/grazing opportunity and stall feed, all elephants were given only stall feed; mineral mixture was given in all camps. Ninety three percent of private elephants were given only stall feed. All temple, zoo and circus elephants were given only stall feed; feeding place was the enclosure/ shelter (off-season) or any wayside place/ temporary camp-site while working.

The zoo and FC elephants showed relatively higher M-R, with greater variation being observed for the zoo elephant. Relatively low deviation was seen for FC elephants. The other regimes, private, temple and circus showed deviations of more than 75% from E-R.

Among the four adult females in FCs, all were said to be in regular oestrus; only two had mated and produced one calf each. For private, temple and circus female elephants, occurrence of oestrus was not known; physical contact with males was not allowed. The zoo elephant had been provided opportunity to breed, the elephant could currently be beyond breeding age. Among the regimes observed, only FCs showed relatively lower deviation from E-R. The other regime, zoo elephant, did not show any deviation from E-R.

All six adult males in FCs exhibited signs of musth; no breeding opportunity was given for two of the males, two had shown signs of aggression. Musth, among male elephants with private owners, was seen in 86% of the observed animals; aggressive behaviour was seen in 60% of the elephants; 53% male elephants had not sired offspring; males were chained/ watered during this period.

Male elephants in temples were isolated/ watered/chained/fed for the duration of musth; were aggressive towards handlers/ strangers; 52% elephants had not sired offspring. The M-Rs are comparable across regimes due to the variation observed for the sub-parameters of this feature.

Presence of intestinal worms occasionally, occurrence of constipation/ indigestion and minor wounds was observed for FC elephants. Loss of vision, foot related problems (toe nail cracks/ foot rot) were observed for elephants with private owners. For temple elephants, foot related injuries, loss of vision, colic, other minor ailments and injuries were observed. Chronic wounds on fore-legs, foot-rot and anemia were apparent for the circus elephant.

FC elephants showed relatively low deviations from E-R indicating better health status and adherence to a prescribed veterinary protocol. The remaining regimes, except for circus, showed comparable deviations from E-R implying similarity in the features observed. The circus elephants showed maximum deviation from E-R.

All FC, Private, temple and zoo elephants had access to a veterinary doctor; experience in treating elephants ranged from 5 -14y for FC, 7 to 33y for privately owned elephants; visit frequency by the doctor was daily to occasional for the regimes investigated. No permanent veterinary personnel were available for the circus elephant.

Deviations across regimes were comparable as variation in the M-Rs for each overlapped. This implies similarity in conditions across the regimes. This was not the case for the circus elephant which showed a maximum deviation of 100% from E-R.

For handlers of privately owned elephants, mean experience in this profession ranged from 1-35y; mean experience with a specific elephant ranged from 0.02-24 years. Temple elephant handlers' experience in this profession ranged from 2-38y; 34% (N= 116) of handlers were not trained. The deviation from E-R was comparable across the regimes, indicating similarity in conditions; both showed relatively low deviations.

Among FCs, most handlers consumed alcohol; salary drawn was Rs.54, 000/- for temporarily employed handlers and Rs.1, 20,000/- for the permanent handlers; insurance cover was provided by the forest department.

Sixty seven percent of handlers with private owners came from a background not related to handling elephants, mean annual salary given to them was Rs. 43,000/- ranging from Rs. 14,000 to 80,000/-. Only 25% of handlers were covered by insurance; 50% handlers consumed alcohol (N= 18), after work / on alternate days / weekly / occasionally.

Half of the observed temple handlers came from a background not associated with elephants. Mean annual salary was Rs. 50,954/- ranging from Rs. 36,000/- to 84,000/-; 76% of handlers were said to consume alcohol, all after work hours; 7% (N= 123) of handlers were not covered by insurance.

Overall M-R for elephants (for all the observed parameters) when compared across the regimes shows the relative better welfare status of FC elephants. The percentage of parameters accounting for more than 50% deviation from E-R was in the range of 55- 90% for all the other regimes. Hence, more than half the observed parameters/ sub-parameters deviated by 50% or more from norms prescribed by the team of experts.

THE ISSUES AND RECOMMENDATIONS

The captive elephant scenario in Kerala has reached such complex proportions that finding realistic and sustainable solutions may be very difficult.

The conflict and lack of coordinated action between State Forest Departments, NGOs, veterinarians and other stakeholders of elephant culture, has only added to the problems. Consequently, Kerala does not have a systematic approach in addressing its myriad captive elephant issues.

Owners and mahouts are victims of the current state of affairs that is a direct result of lack of realistic/holistic policy decisions and the lack of an organized approach to elephant management by the State Forest and Animal Husbandry Departments.

SPECIFIC PROBLEMS

- Captive elephants are exposed to heat for long hours during the festival season.

- The duration of certain parades and the timings is the reason for lack of appropriate physical and psychological exercise for the elephants. The animals are made to stand still for varying durations of the festival/ parade and on completion of one festival, are transported to the next festival/ parade for performance of similar activity.

- Spacing of elephants within a given area during parades is neglected, resulting in increased number of elephants within a given space.. Ideally, a perimeter should be provided per elephant (of about 10 ft space between each elephant) so that the elephants do not get into fights regarding food or other reasons, during parades and processions.

- Organizing or elephant booking for festivals is highly mismanaged by brokers and owners, i.e., brokers do not take the elephant's biological needs as well as the logistics of transport/travel into consideration while booking.

- During the festival season, elephants do not receive sufficient fodder and water for drinking and bathing. Providing nutrition to elephants is a neglected area with no scientific basis for the current methods of feeding and food types provided.

- Lack of sleep is cited by many mahouts as the reason for elephants supposedly becoming violent, more than any other factor. Elephants with a height of 8.45-9 ft are the most stressed out, with regards to sleep as they are more in demand for festivals, travel more and hence receive less sleep.

- Transportation by lorries has not only proven dangerous (due to accidents) but causes them to attend more festivals within a short duration of time.

- A lot of elephants in Kerala are *outsiders* (arriving from other states). These non-native elephants are immediately, after arrival into the state, pushed into the mainstream elephant culture with no appropriate training or conditioning period. Most of these elephants are not familiar with the language in which commands are given, are unused to the diet and also the festival culture. Hence, many of these elephants panic or become aggressive, out of confusion or uncertainty, during parades.

- Musth is another factor, which according to experts, coincides with the festival season of Kerala, in most elephants.

- Elephants with injuries, abscesses, foot problems, open wounds, etc., do not receive appropriate care, nor periods of rest to allow their wounds to heal.

- Also elephants with painful conditions such as rheumatism, arthritis, bronchitis and other chronic medical conditions are rarely exempted from festivals. Though legally it is required that an elephant be physically fit to attend festivals and needs certification by qualified veterinarians, the same is not being practiced. Owners procure several fitness certificates for their elephants, weeks before the event.

- Influx of untrained mahouts has also been one of the causes for elephant attacks and disasters.

- Absence of an organized disaster management team in cases of elephant rampage

- Currently certain youth groups have voluntarily formed a rescue team to control elephants that have gone amok. Though well meaning, they do not have the necessary knowledge regarding elephant psychology and biology and hence often make situations worse. In fact one of the team members was killed by an elephant during one such rescue attempt. It is possible to organize and train these groups.

Despite the complex issues prevailing in Kerala there is one vital factor which is most significant and favorable for future welfare activities. There is a desire within a certain section of the owner/mahout community and the general public, to improve the existing situation. Therefore, if the various welfare agencies work in a coordinated manner, along with mounting social pressure, the stakeholders of elephant culture will be forced to improve.

However, for this, the primary requirement is for the various welfare oriented agencies and government departments, to cast their differences aside, and work together for a common goal to develop a realistic policy for addressing the needs and issues of Kerala's elephant festival culture, which has reached crisis proportions.

It is also important to debate upon and resolve the various ethical issues and socio-cultural practices associated with captive elephant keeping in Kerala.

Due to reasons that are unique to Kerala, two approaches could be adopted to address its captive elephant issues - The *in-situ and* ex-*situ approaches*.

THE *IN SITU* APPROACH

Rehabilitation or welfare measures adopted for the main stream elephant culture circuit with various stakeholders such as owners, mahouts, brokers, general public, festival committees, etc.

This could constitute welfare measures such as:

1. Providing regular health care services for elephants by organising health camps
2. Technical counsel for various management issues
3. Undertaking research on various aspects associated with elephant care: the concept of "care" may have different meanings depending on the stakeholder— with increased knowledge on the priorities of each management level, a suitable approach could be evolved to improve the welfare status of the elephant/s
4. Conducting workshops, discussions involving stakeholders such as owners, mahouts, and the State Forest department, temple committees etc, on associated issues of elephant management
5. Conducting training programmes for mahouts/owners, mahout welfare programmes, organising awareness programmes for the general public
6. Setting up an academy for elephant and mahout training
7. Monitoring movement of elephants across the state border, with inspection of elephants for their health, ability to understand commands in local language, particulars of itinerary
8. Maintaining a "blacklist" of habitual offenders regarding welfare of their elephants
9. In extreme cases, legal action could also be taken

THE *EX SITU* APPROACH

The rigors of work or the absence of a natural environment brings forth the need for a place where such provisions can be made available. Often elephants may need to be permanently/temporarily isolated from the mainstream for a variety of reasons (poor health, age, temperament, adapting to a new mahout, etc.) and need to be provided special care at Rescue/Rehabilitation/Care centres (RRCs). This would constitute the ex-situ approach.

The concept of RRC centres must be re-defined in Kerala's context. As mentioned earlier, Kerala's elephant owners have the potential to improve. If they are convinced of the integrity of a certain method , economics is not a constraint for most owners, in making changes in their management practices. But unfortunately Kerala does not have a readily available model for optimum elephant care which can be emulated by individuals or groups of owners. Even if one such model were to be developed, the owner community whould be encouraged to adopt or simulate similar conditions themselves. At present, the focus seems to be on legal issues rather than improving the welfare of captive elephants in the state.

The objective of RRC Centres must not be to increase the number of elephants within the facility but on the other hand increase the number of owners to simulate similar conditions on their own property. However, in reality, there will most definitely be elephants that need temporary or permanent shelter within the facility. Confiscation should be the last option.

This strategy will have more acceptance among owners and they themselves might start seeking counsel voluntarily if it is shown to be successful in improving the objectives of all involved. Gradually, it is hoped that owners will establish a trend to accept and seek counsel from RRC centres.

Therefore, primarily it is essential to establish the concept of rehabilitation and care for elephants within the minds of the stakeholder community. It is here that the role of RRC centres becomes significant. RRC centres can demonstrate to the elephant owner/lover community the emotional, economic and aesthetic value of restoring the physical and behavioural health of sick elephants.

Keeping the above vision in mind, RRC centres could carry out the following functions, (minimizing economic loss to the owner and maximizing welfare status of the captive elephant/s):

1. Treat and shelter captive elephants that are temporarily indisposed both physically and psychologically
2. To demonstrate to the elephant owner/lover community, the emotional, economic and aesthetic value of restoring the physical and behavioural health of sick elephants
3. To adopt and shelter elephants that cease to be economically viable and have turned a liability to the owner due to reasons of old age and/or terminal illnesses
4. To explore the feasibility/viability of involving less productive elephants in tourism as an avenue of income generation for their maintenance
5. To develop realistic, elephant friendly and cost effective models of elephant care which can be replicated by owners individually and in groups
6. To provide technical counsel on optimal elephant care
7. To provide training on various management aspects: feeding/ veterinary care

Ideally, once a standard for optimal care is established and elephant stakeholders realise the significance of such a condition, the *insitu* and *exsitu* approaches must function in a cyclical manner. Gradually the need for RRC centers should cease. But then that is wishful thinking. As long as there are captive elephants, their will always be some amount of abuse and need for external intervention. But the philosophy or vision should be to aspire for such a situation.

AREAS OF ELEPHANT MANAGEMENT AND WELFARE REQUIRING RESEARCH

1. Developing alternate, economic sources of fodder and possibility of introducing a mixed diet and varieties of food items; disposal of fodder waste and dung
2. Resolving the water scarcity for elephants based in urban areas

3. Developing an optimum and regional model for elephant care
4. Developing elephant-friendly sources of employment
5. Addressing the psychological needs of Kerala's tuskers (How best to provide them a social life), management of musth
6. Developing the best training and handling methods (Relevance of the traditional systems of training and handling in the present socio-cultural climate)
7. Using elephants at festivals
8. Climate of the festivals
9. Numbers of elephants at festivals
10. Using female elephants for festivals
11. Defining genuine elephant welfare
12. socio-economics of elephant keeping
13. welfare management of mahouts/ cawadies

SPECIFIC RECOMMENDATIONS FOR MANAGEMENT REGIMES

Elephants owned by the state forest department

MUTHANGA FOREST CAMP

- The maintenance of only male elephants without access to females is not ideal. While successful breeding may result in over-population in this facility when considered in the long-term, measures can be taken to maintain a stable number without reducing the animals' welfare status. Presence of females may facilitate the return of male elephants from the forests
- The contribution of tuskers, such as the elephants in the camp, to the wild gene pool will be immense especially considering the loss of such animals to captivity. Hence, allowing the males to wander and mate with wild females may be an option.
- Allowing the elephants to free range at night and during the day, with a few hours of human control for bathing/ veterinary practices, command or obedience training would be ideal. The problem of retrieving the elephants everyday would have to be solved through involving handlers in observing the elephants' specified durations/ through radio-collaring.
- The use of elephants as *Koonkies* is important considering the increasing incidents of human-elephant conflict. This, however, should not over-ride the elephants' welfare status by the absence of features essential to their biology.
- The elephants may also be used for tourism with the statute of prioritizing the elephants' welfare at all times
- Timely inflow of funds or measures to implement revolving funds
- Motivation measures to be implemented for boosting morale of mahouts/ cawadies and schemes to improve their welfare

ARIANKAVU FOREST CAMP

- The purpose of keeping the elephant was timber hauling— this should not over-ride welfare considerations of providing opportunities for the elephant to express its natural behavioural repertoire
- Wild elephants spend most parts of a day foraging and are on the move. Thus, timber hauling activities should not be exclusive of the opportunity to forage in natural conditions for the elephants, considering the physically demanding nature of work for the elephants.
- Opportunity to free range in the nearby forests with access to rivers/ streams will be healthy for the elephant (for physical health as well as psychological stimulation) as they engage in species-typical activities
- Considering that the elephant is nearing "retirement" age, it would be appropriate if efforts were made now to initiate a regime where activities that enhance its natural behaviours are promoted. This would help when the elephant is transferred to a care center and exposed to new and unknown elephants and living conditions.
- In the event of transfer of the elephant, its handlers should not be changed, considering the age of the animal. The change of location and handlers has to be gradual, giving opportunity for the elephant to acclimatize.
- Motivational measures to be implemented for boosting morale of mahouts/ cawadies and schemes to improve their welfare

KODANADU FOREST CAMP

- Kodanad camp is known for its rescue of wild calves. With a natural physical environment, the camp can provide better living conditions for these elephants by concentrating on maintaining a social herd of elephants (of different ages and sex). The elephants need to be left to free range in the forest since this will help in providing opportunity to express species-specific activities. Providing training to handlers to observe interaction among elephants, in order to form a group of elephants which can survive as a herd in the wild, would be an option. With proper management, the herd could be integrated into the wild as a unit.
- An exclusive manager to administer the camp is needed
- A permanent veterinary care center is needed
- Timely inflow of funds or measures to implement revolving funds
- Motivation measures to be implemented for boosting morale of mahouts/ cawadies and schemes to improve their welfare

KONNI FOREST CAMP

This camp is well known for its expertise in catching wild males and also in training calves. If the policy is to continue to rescue calves/ capture "rogue" males, then there should be a long-term perspective to this approach, keeping in mind the welfare of the elephants.

- One option could be to release the rescued calves to the wild after forming a socially cohesive, maybe unrelated, unit with a relatively older female elephant. This would

involve monitoring the interactions among the elephants which could be done by trained mahouts/ cawadis.

- The other option would be continued existence of elephants in captivity for use in timber hauling/ for tourism. This activity should not impinge on the biological and ecological needs of the elephants. In other words, the emphasis should be on providing near natural conditions (biological and physical) and not on harnessing animals for work or for any other human-oriented activity. Such an approach would be able to provide a factual insight into elephant lives for the general public.
- An exclusive manager to administer the camp is needed
- Timely inflow of funds or measures to implement revolving funds
- Motivation measures to be implemented for boosting morale of mahouts/ cawadies and schemes to improve their welfare

KOTTUR ELEPHANT CARE CENTRE

- The approach of providing a naturalistic setting for the elephants is laudable, but severely limited by way of restricting the animals' movement. Efforts can be made to introduce new individuals to each other, with safeguards to protect them from antagonistic interaction, to establish a socially cohesive group. Handlers could be trained to observe interaction among the newly introduced individuals in an appropriately safe setting (for the new elephants).
- The adult male, though mature and considered old, did not have any psychological stimulation as it was not allowed to free range throughout the day or given any work. The occurrence of musth and the isolation in a separate enclosure would add to restrictions on performing species typical reproductive activities. Exposure to females should be done under supervision as negative interaction among the introduced elephants may result in injuries.
- A policy for deciding the nature of the care center: the kind of elephants selected to be in this center needs to be focused on. If the care center is meant as a "retirement" home for older elephants, then calves need a separate place with a different set of mature individuals in order to replicate a more natural approach.
- A permanent veterinary care center is needed
- The presence of rescued calves (brought from the wild) needs to be viewed from a long-term perspective: will they be released in the wild or will they be maintained in captivity? Each of these decisions will have a different approach in maintaining the elephants in the care-center. A policy needs to be developed and implemented regarding the future of this care-center

TEMPLES AND PRIVATE OWNERSHIP

Captivity for elephants need not be exclusive of all natural conditions: a state existing at present for them in the observed temples and these in private ownership. If temples have to cater to the welfare needs of their elephants, provision for the animals' interests should be paramount. This can be achieved by two ways:

1. putting an end to the practice of keeping elephants by temples keeping in view the long term effect of practice of maintaining elephants with no recourse to express their species-typical behaviours combined with no way of handling an increasing captive population in the event of captive births.
2. continued maintenance of elephants by temples/ private owners but with the prerequisite of providing natural conditions such as physical space with vegetation, unfettered existence, presence of companions (male and female) or at least keeping two or more elephants together, followed by strict monitoring of work schedule.
    - Work schedule should not be packed with attending as many festivals as possible in order to generate higher income. One way of avoiding this could be higher remuneration per festival which may increase the burden on "devotees". Irrespective of the remuneration generated, the number of festivals/ parades attended by an elephant should be limited.
    - Another aspect of work is that the elephants should be provided natural (that is, physical space with vegetation, water, conspecifics, absence of chaining, opportunity to forage) transit living conditions in between periods of work. This implies not only restricted duration of work for the elephants but also provision for the elephants' needs between work hours.
    - Temples within a region could think of setting up a common facility capable of holding each participant's elephant. This can be done independently or in association with the forest department. This will ensure presence of companions for the elephants, socializing opportunities and expression of species-typical behaviours within a limited context.
    - Feeding the elephants needs to be managed scientifically, that is, not only the nutrient needs of the elephants but also psychological stimulation can be an objective while feeding the elephants; cultivation of fodder crops by temples can be practiced
    - Formulation of policies/ monitoring/ providing recommendations on the captive situation for temple elephants needs to be streamlined to a single person or group of persons
    - Establishment of mobile veterinary units to provide health care for temple elephants
    - Motivational measures to be implemented for boosting morale of mahouts/ cawadies and schemes to improve their welfare
    - General public must be allowed to view elephants at a distance and not allowed to touch or abuse elephants during parades or festivals or transportation or rest

Thus, a combination of a natural living environment and regulated working conditions could improve the elephants' welfare status. This option will however, not encompass the future of elephant keeping by temples/private owners. A policy needs to be framed on sourcing of new elephants in the event of death of existing animals and the maintenance of a growing captive population in the event of births among the existing population.

ELEPHANTS IN CIRCUS

Keeping elephants in circuses needs to be banned. It's important to note that the motivation of circus companies is to generate adequate profit through their performances in cities where a large number of people can watch the performance. Even circus companies desirous of fulfilling the elephants' needs, cannot provide the natural environment essential for elephants.

Till such ban on using elephants take place**:-**

- Permits to set up a circus with elephants should be issued only in places with adequate food, water and the possibility for the elephants to fulfil their ecological, behavioural and social needs. This is where the City Municipality and Forest Department can take responsibility for ensuring there is adequate facilities for the duration of the stay where a circus has applied for a permit to perform
- Monitoring of circus facilities vis-à-vis maintenance of records regarding ownership of elephant/s. Veterinary care has to be implemented strictly
- Micro-chipping of existing elephants with circuses has to be implemented
- It is recommended that since basic welfare needs of elephants cannot be met considering the inherent nature and limitation of circuses and their mode of functioning, banning elephants in circuses is the only progressive and humane step to be initiated

Introduction

The state of Kerala is home to an estimated 612-635 elephants (Anon., 2000); Easwaran (Pers. Comm) reported the presence of 760 (±10) elephants in the state and Panicker (2008) stated the onumber was 750 captive elephants. Project Elephant gives a count of around 6000 elephants in the wild for the state (Anon., 2000), thus, captive elephants may account for nearly 12% of the elephant population in the state. Sourcing of elephants for captivity may differ– being captured/rescued from the wild for various reasons or transferred across locations or states. The presence of captive elephants is not only important for the status of the captive population itself but also for the wild population in lieu of the introduction of wild caught/ rescued elephants into the captive situation. Elephants under direct human control and influence are maintained and managed by a diverse set of institutions/ individuals, providing a spectrum of captive conditions which may/ may not cater to the elephants' needs.

Objective

The range of conditions in captivity experienced by elephants will influence its welfare status by altered opportunities for expression of species-typical behaviours. This investigation aims to:

- Assess the welfare status of captive elephants in Kerala, across different management regimes, by considering the physical, social, psychological and health related features in captivity

Handlers are an integral part of the captive elephant system as they are responsible for the day to day management of the elephants. Hence, this report aims to:

- Assess the professional expertise and socio-economic welfare status of handlers

Method

The knowledge gained from studies on wild elephants provides a platform for understanding the ecological and biological needs of captive elephants. The presence of elephants under human control for several thousand years has not resulted in their selective breeding. Thus, their biological/ ecological needs are comparable to those of their wild counterparts.

This investigation is based on two different approaches: an attempt to estimate total number of elephant for the state was made, and using this data, elephant distribution across different types of management was made (see appendix 1 for details of elephants investigated for this approach). The second approach was to select about 157 elephants and assess their welfare status. The welfare was assessed based on a rating scale. Welfare status of captive elephants has been assessed by considering the availability of near natural conditions and quantifying this situation using a rating scale developed by a team of experts from various fields. Health of elephants and veterinary facilities (including other infrastructure) has been taken into account considering the factor of exposure to an altered environment and human influence on the elephants' lives. The existing situation for the elephant/s was surveyed through observation of the animal/s and interview with relevant personnel (Figures 1a, b, c, d, e and f). Data on more than 200 handlers across regimes observed, was available through interviews and the professional experience and socio-economic status is determined based on the data collected.

a

b

c

d

e

f

Figures 1a,b,c, d, e and f: Data collection by direction observations and body measurements (a and b), measuring and weighing (c and d) elephant dung piles, interview with elephant mahouts (e and f)

Rating method

The rating scale from zero (unsuitable conditions) to ten (suitable conditions) was used to assess the welfare status of captive elephants and their handlers. Experts (both wild and captive elephant specialists, wildlife veterinary experts, managers from protected areas, managers responsible for both wild and captive elephants and other wildlife, personnel from welfare organisations and elephant handlers) were invited to assess the welfare based on different parameters and their significance through an exclusive workshop conducted on the subject (Varma, 2008; Varma, et al., 2008; Varma and Prasad, 2008). Experts rated a total of 114 welfare parameters covering major aspects of captivity.

- The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter. For example mean expert rating of 8.0 (SE= 0.5, N=29) for a parameter 'floor' and 9.0 (SE=0.4, N=31) for 'source of water' was arrived at by each expert by averaging across all the experts' values.
- A mean rating for each parameter, across all the participating experts, has been used as the Experts' Rating (E-R) which represents the importance attached to a parameter i.e., for a parameter with 8.0 as the maximum value, only 2.0 (25%) deviation and parameter with maximum value 9.0 only 1.0 or 10% from the prescribed norm is considered acceptable.
- For example, if an elephant is exposed only to natural flooring, the animal receives a rating of 8 and for entirely unnatural flooring the value is 0; if animal is exposed to both natural and unnatural flooring, the value is 4 (as 8+0/2= 8/2= 4). If an elephant is exposed to a natural water source, such as a river, it receives a value of 9; if the source of water is large lakes or reservoirs, it gets 4.5. A value of 3.5 is assigned for small water bodies like tanks and ponds. Tap water (running) gets 2.5 and if only buckets, pots, and tankers are in use, then the allocated value is 0.5. This rating is then averaged across all individuals in that institution to get a Mean Rating (M-R) for that feature. Thus M-R represents the actual situation existing for the elephant/s.
- Therefore, using the maxima given by experts as a base, a rating scale starting from zero to the particular maximum value for that parameter has been used and the data for each animal was collected, in a given regime (for example, forest camp or temple).
- In this investigation, variables which represent a common feature of the captive situation have been grouped to form a parameter. The variables have been termed sub-parameters. For example, the variables shelter type, shelter size, floor type in the shelter; all represent different aspects of the physical space provided to the elephant. Hence, they are grouped together to form the parameter "Shelter" and each constituent variable is a sub-parameter. In this investigation, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters. The Mean Rating (M-R) for a parameter is the mean of M-Rs across related sub-parameters and denotes welfare status of existing conditions on the ground for the particular parameter.
- The number of such related parameters (sub-parameters) varies for each regime.
- Results have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the parameters observed. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.

- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) have been used to indicate the professional/ socio-economic status of value to the handler and his elephant.
- N* refers to number of sub-parameters observed. N refers to number of individuals.
- In the results presented below, the number of sub-parameters vary across regimes; this has been indicated wherever applicable

Results

Population status

The elephants were maintained by four types of regimes, with some institutions or individuals keeping more than one elephant. Table-1 gives the number of owners of each regime and corresponding number of elephants. Among private owners, maximum number of elephants was seen for Kottayam district (86) followed by Thrissur (50), Kollam (47). Kasargod, Kannur, Wayanad, Mallapuram and Idukki districts maintained less than 10 elephants with private owners.

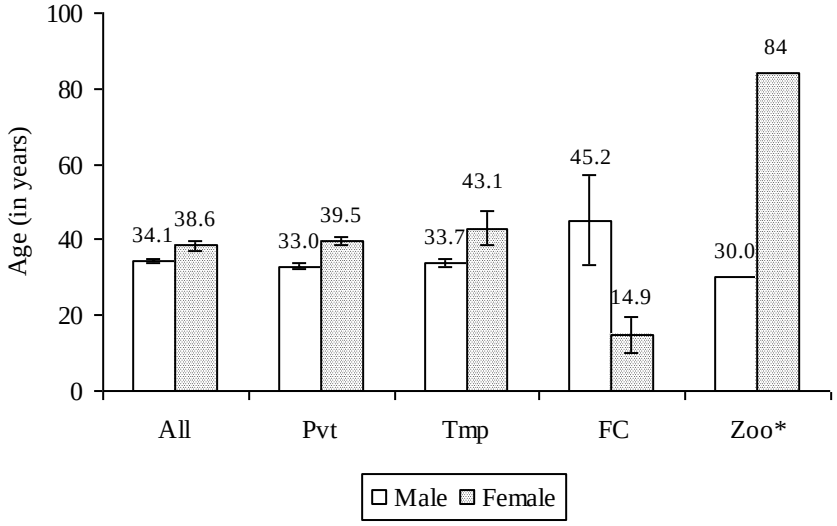
Table 1: Management regime wise number and sex based distribution of elephants in Kerala

Management type	Number of owners	Total number of elephants		Total number of elephants
		Male	Female	
Private owners/individuals	345	417	91	508
All Temples/ Ashram	50	157	17	174
Government temples	3	104	14	118 (67.8%)
Private temples	45	53	3	56 (32.2%)
Forest camp	5	8	10	18
Zoo	1	1	1	2

Figures in parenthesis indicate percentage wise distribution of elephant among all temples

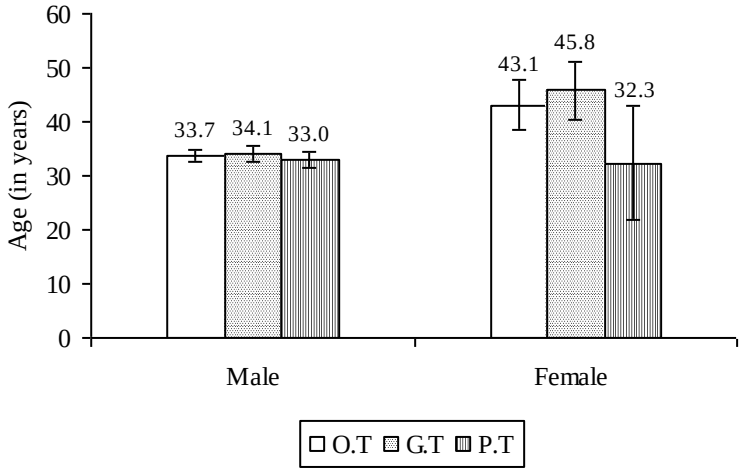
The distribution shows that the number of elephants per owner varied: it was minimum for private individuals (1: 1.5: owner: elephant number) followed by zoo (1:2) and comparable values for temples (1: 3.5) and forest camps (1:3.6). Among the temples, government run temples had the highest ratio of owner to elephant (Travancore Devaswom Board— 40 elephants; Guruvayoor Devaswom Board— 65; Cochin Devaswom Board— 13).

Figure 2 gives the mean age of elephants in different regimes; the total number of males whose age was known was 565, the total number of females with known age was 116. Figure 3 gives the mean age of elephants among the government and private run temples.



*: only two elephants, one male, one female

Figure 2: Mean age of males/females across regimes



O.T: Overall temples G.T: Government run temples P.T: Private run temples

Figure 3: Mean age of males/ females among government and private run temples

Welfare status

A total of 157 elephants were observed across five ownership types and relevant data was collected. Of these, 26 were females and 131 were male elephants.

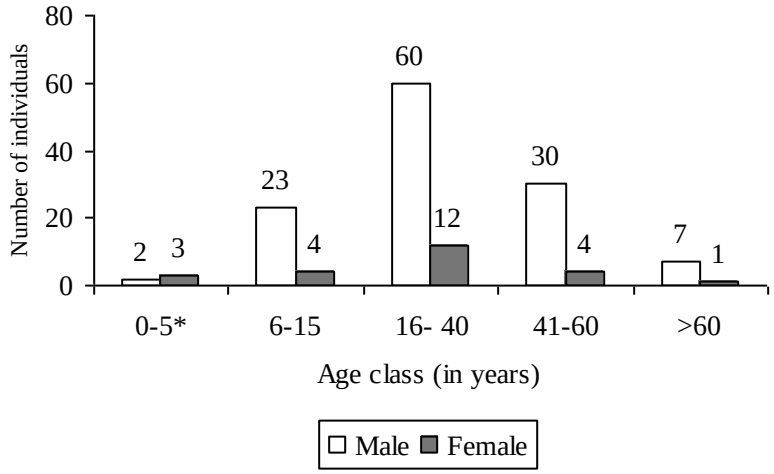
The ownership type was based on several factors:

a. Forest camps (FC) were characterized by ownership by the state department of forests and located in forest areas

b. Zoological park (Zoo) was a government run unit characterized by maintainance of animals of different species in confined spaces
c. Private owners (Pvt) were individual owners
d. Temples (Tmp) were religious institutions/ organizations owning elephants (includes government and non-government run temples)
e. Circus was a unit maintained by private individual/ company maintaining elephant/s as performer/s

Five FCs were observed across different districts of Kerala. These were: Aranyakavu, Konni, Kodanad, Kottur and Muthanga. The results for FCs have been presented by taking a mean of values across all observed FCs. The total number of elephants maintained by the state forest department in 2008 was 19 (referred online).

Figure 4 gives the age distribution of the observed captive elephants in Kerala, irrespective of ownership type. It can be seen that maximum occurrence, across both sexes, was between 6-60y with most males and females being in their prime (16-40 yrs). Presence of calves accounted for 12.5% of the captive female population (N= 24) and 1.6% of the male population (N= 122). Tuskers accounted for 80% of the male population (N = 131).



*: 0 refers to neonates

Figure 4: Age distribution of observed elephants in Kerala

Figures 5a gives the regime-wise percentage contribution to the observed population (N= 157). Figure 5b gives the regime-wise contribution within each sex class (N= 26, female elephants) and (N= 131, male elephants).

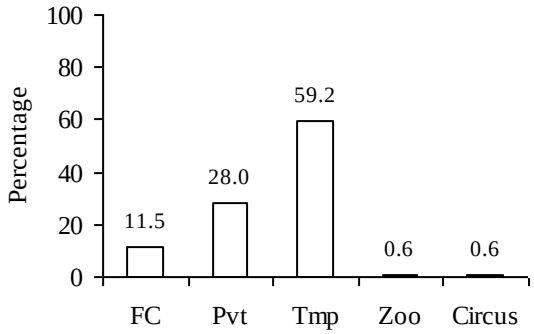


Figure 5a: Regime-wise contribution to overall population

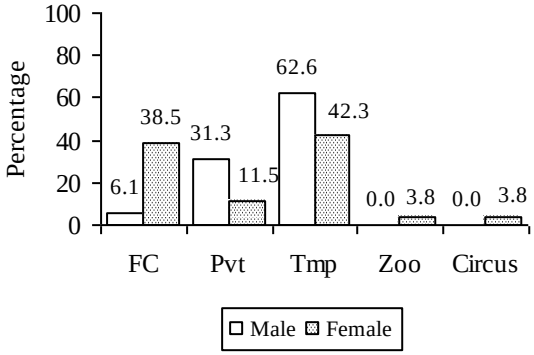


Figure 5b: Regime-wise contribution to each sex class

Source

Bringing wild-caught elephants into captivity imposes severe stress and trauma on the elephants and also reduces the gene pool available to the remaining population in the wild. Even when captive born elephants are shifted across owners, they undergo change in their daily routines, are exposed to new elephants, established bonds among existing elephants are broken and that may experience different handlers. All these factors are possible sources of stress and poor welfare.

- Among the 18 FC elephants, 56% were rescued from the wild and 33% were wild caught. Only two elephants were captive born
- All the elephants with private owners had been purchased; among these 26% (N= 23) had been captured from the wild (by the state forest department)
- 99% of temple elephants had been purchased or received as donations (N= 82); one elephant had been rescued in 1936 from the wild
- The zoo had a single elephant* which had been captured from the wild
- The circus elephant had been purchased

Figures 6a and 6b give the comparative rating across regimes and deviation from E-R respectively. It can be seen that ratings are comparable across all regimes, all showing a deviation more than 60% from E-R, indicating an absence of captive born elephants.

* The welfare status includes only one elephant for the zoo, as this was the status when the welfare status report on the zoo was published. Later, the zoo brought in a male elephant, thus, maintaining two elephants within its premises. This number has been covered in the population status of this report.

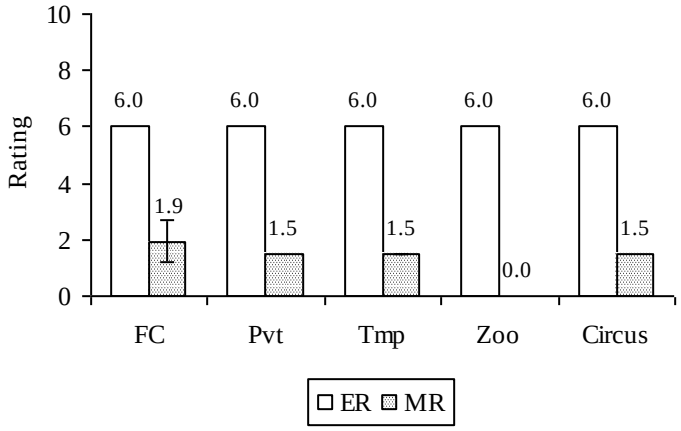


Figure 6a: Comparison of E-R and M-R for source across observed management regimes

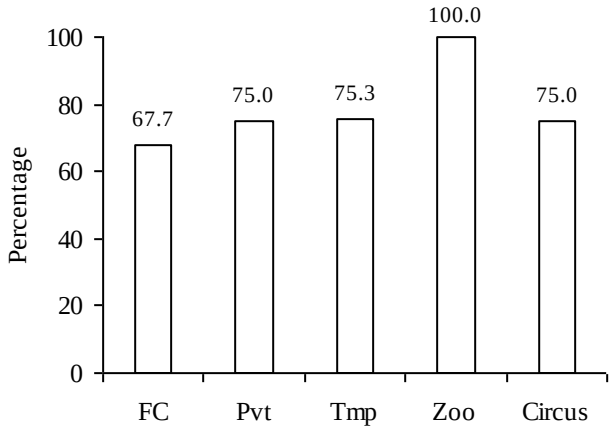


Figure 6b: Percentage wise deviation from E-R for source of elephants

Purpose

Keeping elephants for a specified objective should also include provision for expression of natural behaviours in a near natural physical environment.

- Among the five FCs observed, three maintained elephants for timber hauling, one was a center for *koonkies* (*kumki*) and one was a care center meant for providing rehabilitation for elephants
- All private elephants were maintained for use in festivals/ processions/ religious/ tourism related work
- The zoo elephant was maintained for display purposes

Figures 7a and 7b give the comparative rating across regimes and deviation from E-R respectively. Greater deviations from E-R observed for private owners and the zoo shows commercial use in an un-natural physical environment for the elephants.

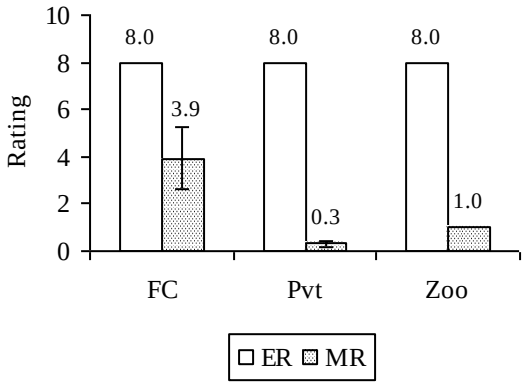


Figure 7a: Comparison of E-R and M-R for purpose across observed management regimes

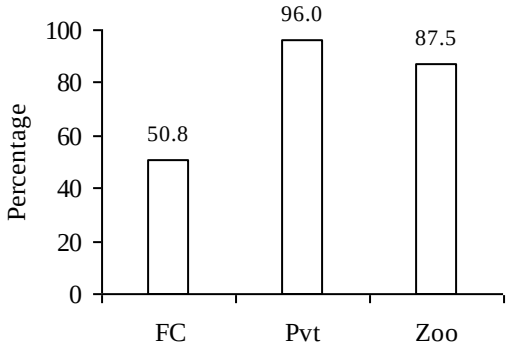


Figure 7b: Percentage wise deviation from E-R for purpose

Shelter

Studies on wild elephants (Sukumar, 2006) have shown the vast areas covered as part of home range (250-1000km^2), with smaller home ranges covered by elephants in Sri Lanka. The animals traverse across varied landscape as they forage and perform species-typical activities.

- Thirty nine per cent of the FC elephants (N= 18) were allowed free ranging opportunity for a part of the day in forest conditions; all elephants had access to natural floor, roofes or tree shade was available
- Physical space for private elephants was limited to less than 1 km^2, nearly 70% of the elephants (N= 42) were kept in open type shelters, partial tree cover was available as shade, earthen floors were available for 93% (N= 41) of the elephants
- Physical space available for elephant was less than 1 km^2 for temple elephants, 95% (N= 85) of the elephants had access to natural flooring, open type shelters were provided for 83% (N= 86) of the elephants
- Shelter size used by the zoo elephant was 40m^2, earthen and concrete floor was provided, day shade was provided by partial tree cover
- Circus elephant was tied in an open area with natural flooring, no shade was available (Figures 8a to 8p).

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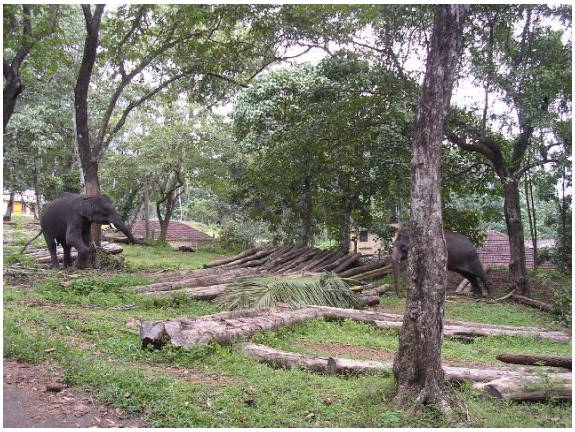

n

o

p

Figures 8a, b, c, d, e,f,g, h, I, j, k, l, m, n, o and p: Shetter and heygincic environment provided to elephants from different management regimes in Kerala. Shelter provided at Kodanadu Forest Camp (a and b), shelter, floor and shade provided for elephants in Konni Forest Camp (c and d), open shelter, floor and shade provided to an elephant owned by private ownership (e and f), shelter, floor and shade provided to elephants belong to a temple (g and h), shelter, floor and shade provided to a elephant in a zoo (j and j), shelter and floor available for an elephant belong to a circus.Hygiene maintained around the elephants in forest camps (m and n) and temples (o and p).

Figures 9a and 9b give the comparative rating across regimes and deviation from E-R respectively. The ratings are comparable across regimes as each regime shows overlap due to variations present in the shelter conditions provided. Thus, the relatively low deviation from E-R for FC is offset by the variation in its M-R implying non-uniformity in the features observed.

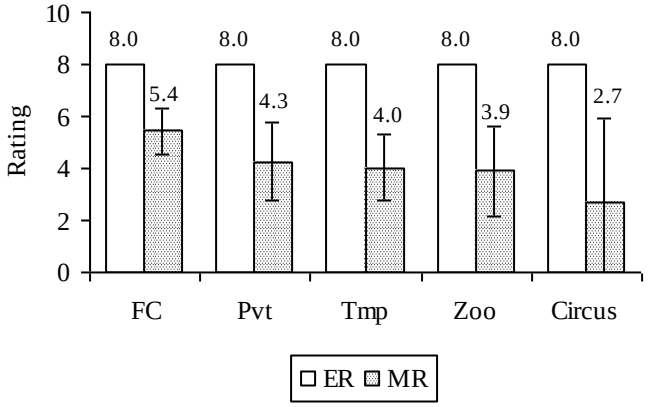

Figure 9a: Comparison of E-R and M-R for shelter across observed management regimes

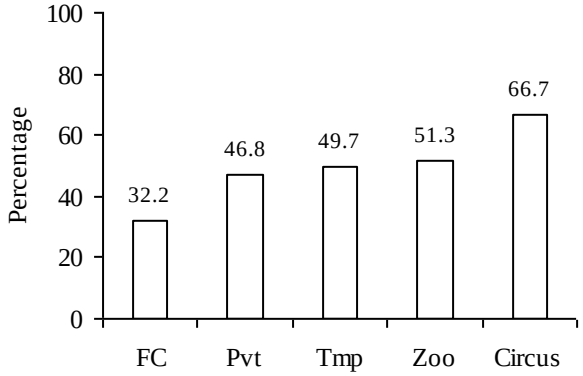

Figure 9b: Percentage wise deviation from E-R for shelter

Water

Subject to its availability, elephants are known to access water sources at least once per day (Sukumar, 1991). Various activities such as dust bathing/ wallowing/ socializing are performed at these sources. Access to clean water, relatively free from contamination can be obtained from free flowing sources such as rivers/ streams. Such sources will also provide an opportunity for expression of species typical behaviours which is not possible when water is provided by taps/ hose-pipes.

- Only 22% (N= 18) of FC elephants did not have access to steams/ rivers (Figure 10a), 83% (N= 18) had access to more than one water source (stream/ well-water (Figure 10b)/ tap water); all elephants were bathed at least once per day with natural materials (coir/ coconut husk)
- Non-river/ stream sources (taps-Figures 10c and d-/ bore-wells/wells) was available for 95% of private elephants, 62% (N= 42) were given more than one source of water, bath frequency ranged from daily to once a week, bathing materials used were coconut husk, pieces of concrete, ceramic stones

- 70% temple elephants had ponds (Figures 10e and 10f) as water source, 15% wells and only 10% had access to rivers/ streams/tap water (Figures 10g and 10h); Bath frequency varied from daily to fortnightly; Bathing materials were coconut husk/ pumice stone/ ceramic stones/ natural rock/ fibre brushes
- Tap water and pool were water sources for the zoo elephant; bath frequency was once in two days; materials used for scrubbing was coconut husk
- Tap water through buckets was provided for the circus elephant

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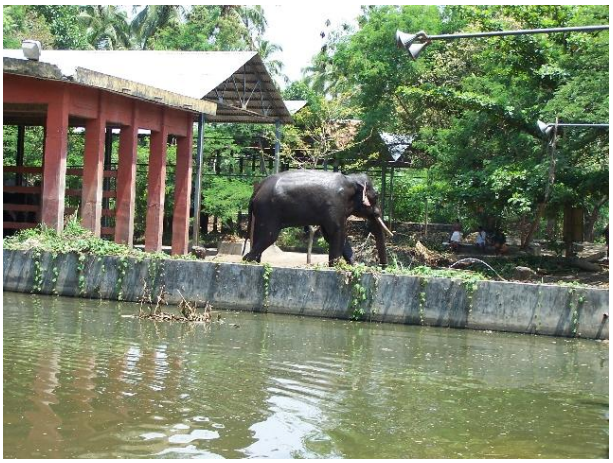

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h

Figures 10a, b, c, d, e, f, g and h: Sources of water for elephants belonging to different management regimes in Kerala; natural stream (a), and well (b) as water source for forest camp elephants, tap water as source for an elephant belong to private ownership, pond and hose pipe as sources for elephants owned by temples (e, f, g and h).

Figures 11a and 11b give the comparative rating across regimes and deviation from E-R respectively. FC elephants were given relatively higher rating showing lesser deviation from E-R and consequent better welfare status for this parameter. The ratings were comparable for all other regimes and relatively low. Variation in M-R was also comparable for all regimes, being relatively low only for FC, implying non-uniformity in the standards of the facilities provided.

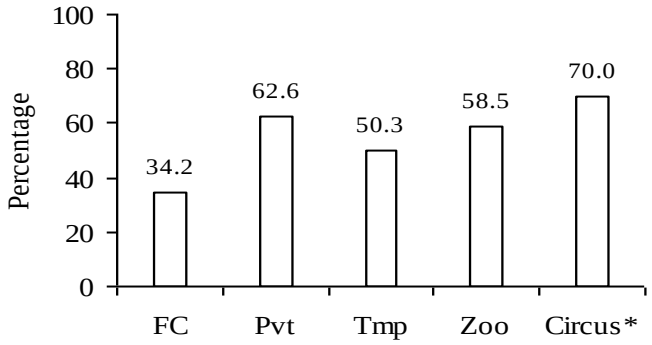
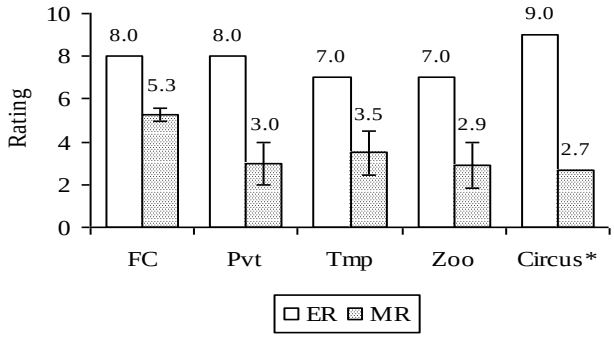


Figure 11a: Comparison of E-R and M-R for water across observed management regimes



*: only one sub-parameter observed

Figure 11b: Percentage wise deviation from E-R for water

Sleep

Prolonged or too little sleep may indicate an underlying problem among the elephants. Unsuitable sleeping areas could result in health problems in the long-term.

- All FC elephants were chained at night; chain length was 1m for the observed elephants (N= 13); flooring was earthen for all elephants
- Sleeping area size varied from 10ftX10ft (98% of the elephants, N= 42) to 1km^2 for private elephants, mean sleep duration was 5.6h (off-season) and 4.8h (working)
- Temple elephants used the shelter as the sleeping place during off-season, otherwise the location depended on the work schedule
- Sleeping are was 40m^2 with concrete floor; sleep duration was 6-7h for the zoo elephant
- Morning shelter was also the sleeping place for the circus elephant

Figures 12a and 12a give the comparative rating across regimes and deviation from E-R respectively. Temple elephants appear to show minimum deviation among the observed regimes, however, the variation in E-R was relatively high contributing to an overlap of

ratings with other regimes. It indicates absence of uniformity in the observed features for the elephants, making it on par with other regimes.

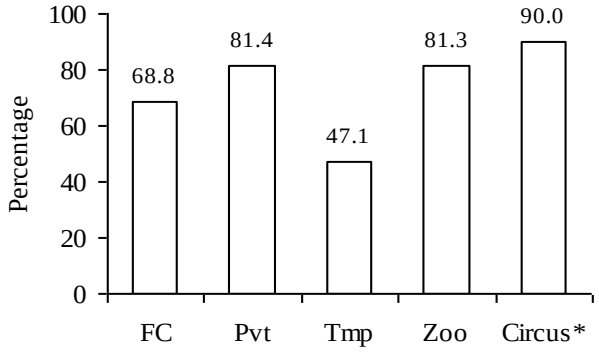
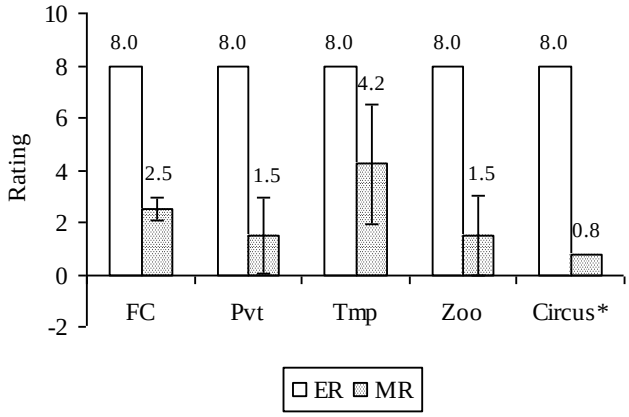


Figure 12a: Comparison of E-R and M-R for sleep across observed management regimes



*: only one sub-parameter observed

Figure 12b: Percentage wise deviation from E-R for sleep

Walk

Wild elephants have been observed to be rarely still, being on the move for most parts of a day (Poole and Granli, 2009). In captivity this aspect is restricted either due to use of elephants for human directed work or chaining the elephant to a place.

- All FC elephants were given opportunity to walk in the morning
- 85% of private elephants were allowed to walk (N= 40); nature of terrain for walking was on slopes (for timber work) or tarred roads; more than 20kms was covered while working and less than 5kms during off-season, i.e., opportunity to walk ranged from no walking days to over-walking periods (work).
- Among the temple elephants, 50% (N= 70) were not given an opportunity to walk; nature of terrain was tarred roads/ village roads/ mud roads
- The zoo elephant was walked once a week for 4kms

- The circus elephant was not walked regularly, only for work such as begging/ when hired out , it was allowed to walk

Figures 13a and 13b give the comparative rating across regimes and deviation from E-R respectively. FC elephants showed minimum deviation among the regimes observed. Variation was observed for private and zoo elephants indicating non-uniformity in standards for the features observed.

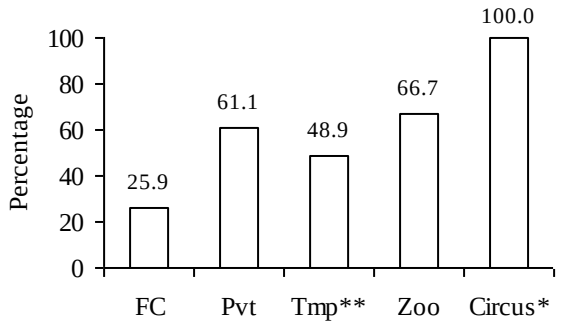


Figure 13a: Comparison of E-R and M-R for parameter 'walk' across observed management regimes

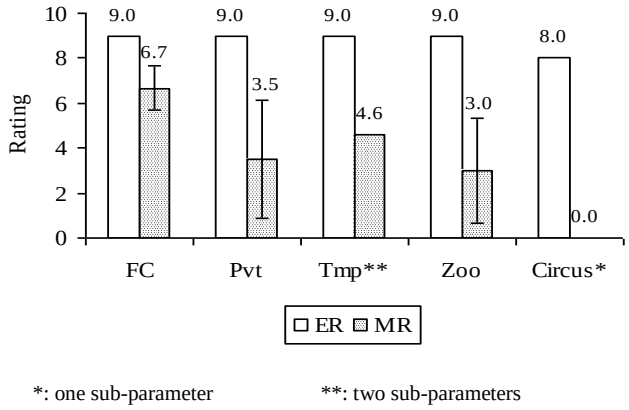


Figure 13b: Percentage wise deviation from E-R for parameter 'walk'

Social interaction

Elephant society is known to be complex (Poole and Moss, 2008), females maintaining matriarchal bonds across generations; males have been observed in non-aversive interactions in the wild (McKay, 1973).

- Except for an adult male in one FC, all elephants were given opportunity to interact (Figures 14a, b, c, d, e and f) for at least 2hrs per day; number of individual varied from 3- 5 of different age/ sex
- Interaction for private elephants was possible if the owners maintained more than one elephant or when the elephants were taken for work; 68% owners (N= 19) maintained only male elephants

The circus elephant was maintained in isolation a

b

c

d

e

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Figures 14a,b,c, d, e,and f:Scope for interactions among elephants in different management regimes in Kerala, interaction among the elephants in forest camps(a and b), among the elephants from private ownership (c) and temple (d), and elephants from a zoo (e) and a circus (f)

- 76% (N= 22) of temples did not provide opportunity for interaction during off-season; number of individuals ranged from 1 (off-season) to 20 (work)
- The zoo elephant was maintained singly

Figures 15a and 15b give the comparative rating across regimes and deviation from E-R respectively. The variation in M-Rs across FCs, private owners and temples showed overlap in values implying similarity across the observed management systems.

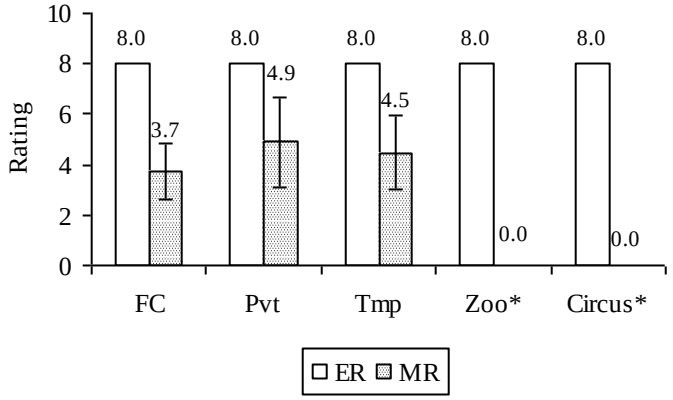
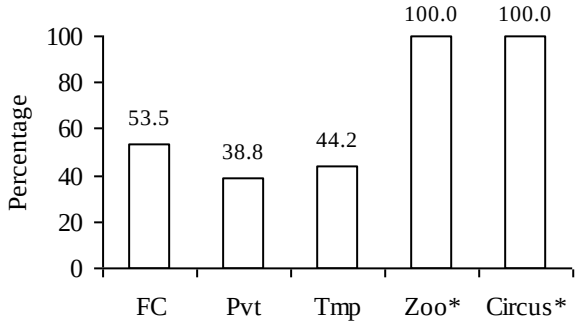


Figure 15a: Comparison of E-R and M-R for social interaction across observed management regimes



*: one sub-parameter only

Figure 15b: Percentage wise deviation from E-R for social interaction

Chaining

The practice of chaining elephants has been linked to increase in frequency of stereotypy (Gruber, et al., 2000); Kurt and Garai (2007) state the occurrence of abrasion related injuries associated with chaining in elephants.

- Thirty nine perceantages (N=18) of FC elephants were given varying durations of free-ranging opportunity in the morning; duration of chaining ranged from 12- 20hrs; 1m free chain length was used for the observed elephants
- Sixty nine percentages (N= 39) of private elephants were chained in more than one region of the body; 8% (N= 24) were allowed some duration of free-ranging opportunity; chaining duration (off-season) was 18-24hrs

- All temple elephants were chained in more than one region of the body; chaining duration was 18-22hrs; hobbles were used for 54% of the observed elephants (N= 79)
- The zoo elephant was chained using hobbles in its day enclosure for 16h; free-ranging opportunity was not given
- The circus elephant was chained for 22hrs; no free-ranging opportunity was provided (Figures 16a, b, c, d, e, f, g and h).

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Figures 16a,b,c,d,e,f,g and h: Types of chaining observed in different management regimes in Kerala; long chaings used in forest camps (a and b), spike chained used in a private ownership (c), forest official investigating the offence of using pike chain by a private owner, types and regions of chaining for temple elephants (e,f,g) and chiaing of a circus elephant (h)

Figures 17a and 17b give the comparative rating across regimes and deviation from E-R respectively. The M-Rs for all the observed regimes were comparable, indicating poor status across the management systems.

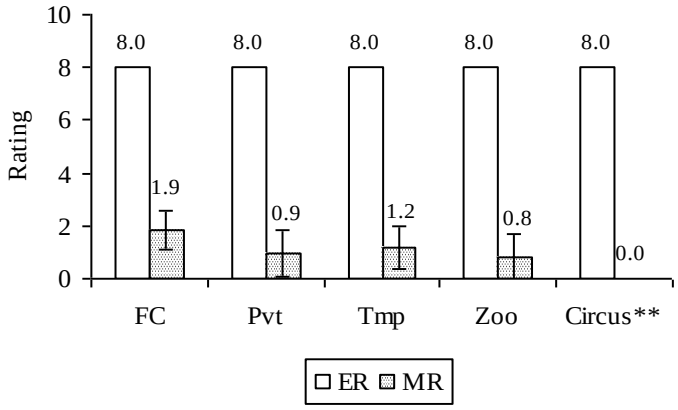
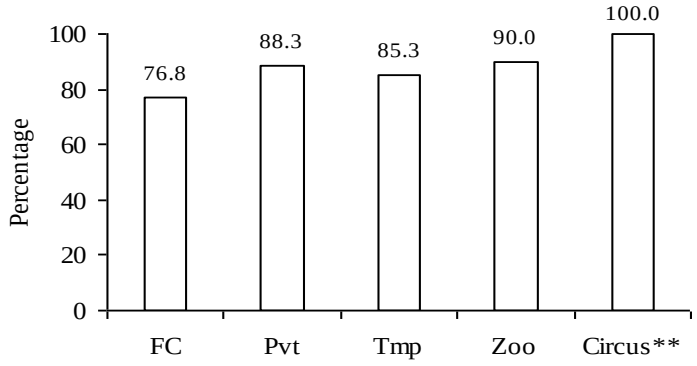


Figure 17a: Comparison of E-R and M-R for chaining across observed management regimes



*two sub-parameters only

Figure 17b: Percentage wise deviation from E-R for chaining

Behaviour

Occurrence of aggression towards people or other elephants may have an underlying cause related to poor captive conditions. It also leads to management problems for the institution/ individual. Stereotypy has been associated with poor welfare conditions (Veasey, 2006) and its occurrence may indicate past/ present deficiency in living conditions.

- Eighty nine percenates (N= 18) of FC elephants were described as docile; stereotypy was observed in 27% of the elephants
- Sixty seven percentages of privately owned elephants (N= 39) were described as quiet/ reliable; 27% of the observed elephants (N= 33) showed signs of stereotypy
- Sixty three percentages of all temple elephants were described as quiet/ reliable (N= 23); 48% (N= 11) of the elephants had injured/ killed public/ handlers; 56% (N= 13) exhibited stereotypic behaviour
- The zoo elephant was quiet but rough towards strangers/ new handlers; no stereotypy was observed
- The circus elephant was described as calm; stereotypic behaviour was observed

Figures 18a and 18b give the comparative rating across regimes and deviation from E-R respectively. Comparable deviations were observed for temple and circus elephants, variation

in M-R being greater for the circus elephant. Minimum deviation was observed for the zoo elephant followed by FC elephants.

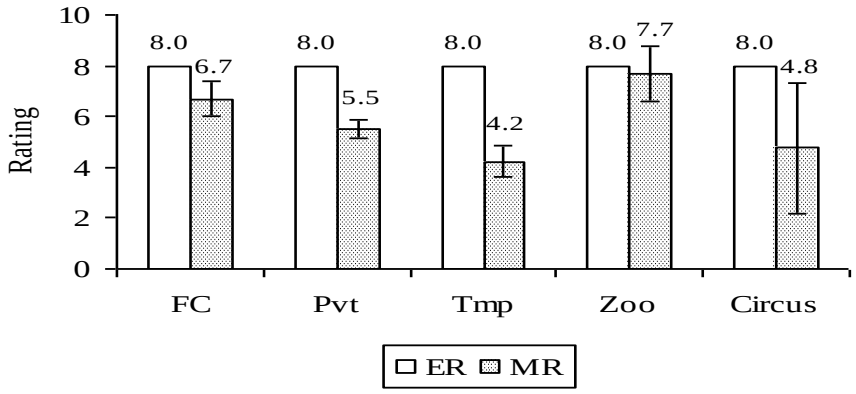


Figure 18a: Comparison of E-R and M-R for behaviour across observed management regimes

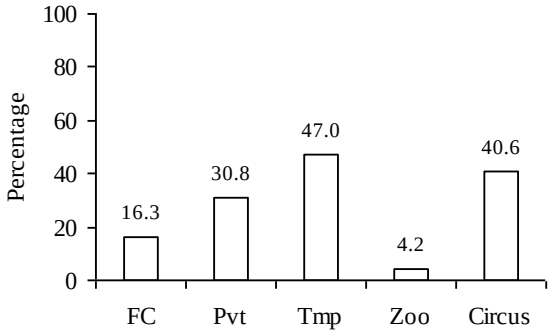


Figure 18b: Percentage wise deviation from E-R for behaviour

Work

Making elephants perform un-natural behaviours such as standing still for long periods/ walk without rest/ food continuously can be damaging to their physical/ psychological health.

- Adult FC elephants were used for timber related work (Figures 19a, and b)/ tourism/ as *Koonkies*; some were used in festivals
- Private elephants were used in festivals (Figure 19c)/ timber work (Figures 19e and f); 51% of the elephants (N= 41) were used only for festivals, 2% only for timber work and the rest were used for both kinds of work; elephants were worked throughout the year
- Only 7% of temple elephants (N= 84) were used for work; work type was participating in festivals (Figure 19d)/ temple rituals/ processions/ parades; Work duration ranged from 6-12h— morning and night
- The mode of travel or transportantion for elephants attending festivals were by lorries or by foot (Figures 19g, h, i and j)
- The zoo elephant was not given any work

- Performing tricks in front of an audience, walking around the arena for 15 minutes per show; also used for begging from public was the work performed by the circus elephant

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Figures 19a,b,c,d,e,f,g,h,i, and j: Types of works observed and mode of travel or transportation of elephants attending temple festivals in Kerala, timber hauling in forest camp (a and b), being part of festival rituals of elephants belong to private ownership and temples (c and d), timber hauling by elephant belonging to private ownership (e and f), mode of travel or transportation by elephants (g, h, I and j)

Figures 20a and 20b give the comparative rating across regimes and deviation from E-R respectively. M-Rs for the three regimes, FC, Private owners and temples, showed overlap due to the variation in each regime, implying existence of similar work conditions due to non-uniformity of standards in the features observed.

No deviation from E-R was observed for the zoo elephant as it was not put to work.

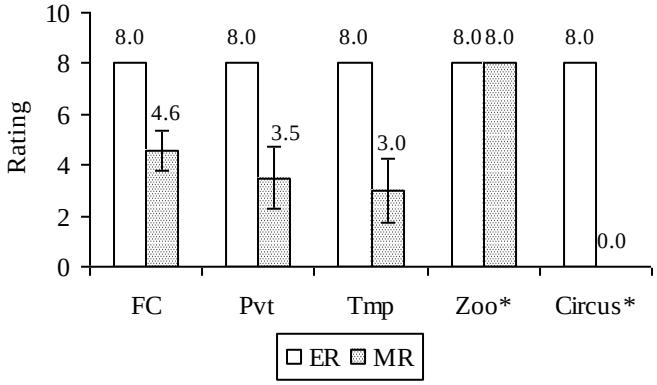
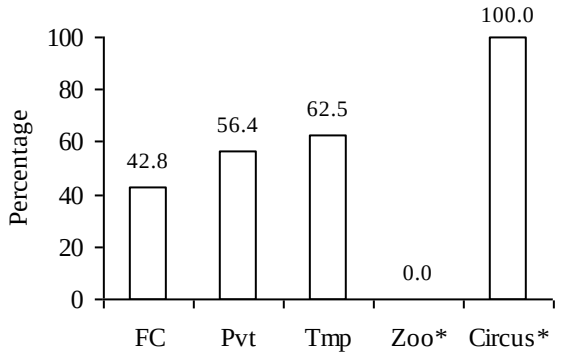


Figure 20a: Comparison of E-R and M-R for work across observed management regimes



*: one sub-parameter only

Figure 20b: Percentage wise deviation from E-R for work

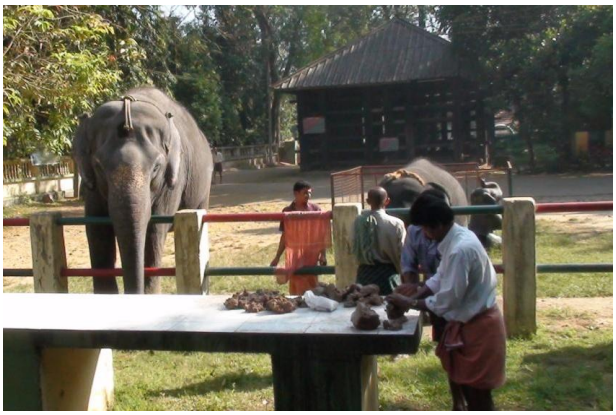
Food

Elephants are known to feed on a number of different plant species (Sukumar, 1991; McKay, 1973), using different parts of their body to manipulate the plants/ plant parts before eating (Kurt and Garai, 2007). Providing only stall feed reduces this diversity and prevents opportunity to learn ways to eat various plant parts. Managerial practices such as maintenance of ration charts will help in identifying excess/ little intake.

- Except for one FC which provided free-ranging opportunity and stall feed, all elephants were given only stall feed; mineral mixture was given; ration chart was maintained
- Ninety three percentage of private elephants were given only stall feed; mineral mixture was not given for any of the observed elephants; except for one location, ration charts were not used
- All temple elephants were given only stall feed; feeding place was the enclosure/ shelter (off-season) or any wayside place/ temporary camp-site while working; ration

charts were not used for most temples observed (N= 18); mineral mixture was not given regularly (Figures 21a,b,c,d,e,f,g,h,i,j,k,l,m and n)

- The zoo elephant was given only stall feed; no mineral mixture was given; ration chart was used
- The circus elephant was given only stall feed; ration chart was not used



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Figures 21a, b, c, d, e, f, g, h, i, j, k, l,m and n: Types of food given to elephants from different management regimes in Kerala; food preparation and the compostion of food provided and exposed to elephants from forest camps (a,b,c and d), raw (e,f,g,and h) and cooked food (i and j) given in private ownership, food items given in temples (k,l,m and n).

Figures 22a and 22b give the comparative rating across regimes and deviation from E-R respectively. The zoo and FC elephants showed relatively higher M-R, with greater variation being observed for the zoo elephant. Relatively low deviation was seen for FC elephants. The other regimes, private, temple and circus showed deviations more than 75% from E-R.

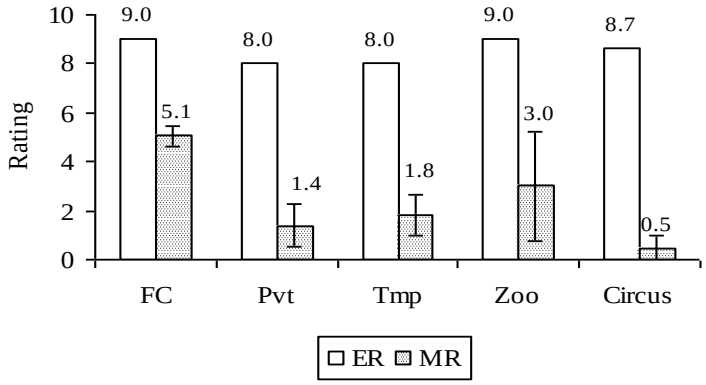


Figure 22a: Comparison of E-R and M-R for food across observed management regimes

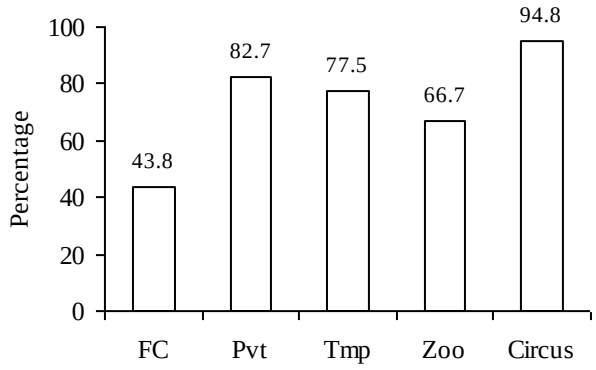


Figure 22b: Percentage wise deviation from E-R for food

Reproductive status (female)

Sukumar (2006) mentions the poor breeding success of captive elephants in range countries. In captivity, the reproductive functioning of female elephants maybe hindered by absence of males, absence of opportunity to express species-specific behaviour as a consequence of managerial decisions; even when mating does occur, use of elephants for work even in advanced pregnancy may result in loss the of the foetus.

- Among the four adult females in FCs, all were said to be in regular oestrus; only two had mated and produced one calf each
- For the three female elephants with private owners, occurrence of oestrus was not known; physical contact with males was not allowed
- Data was available for only two female temple elephants, both of which were not provided opportunity to breed
- The zoo elephant had been provided opportunity to breed, the elephant could currently be beyond breeding age
- The circus elephant was not exposed to males or provided opportunity to breed

Figure 23a and 23b give the comparative rating across regimes and deviation from E-R respectively. Among the regimes observed, only FCs show relatively lower deviation from E-R, considering more than one sub-parameter for reproductive status of females. The other regime, zoo elephant, did not show any deviation from E-R, but was based on a single sub-parameter for this feature.

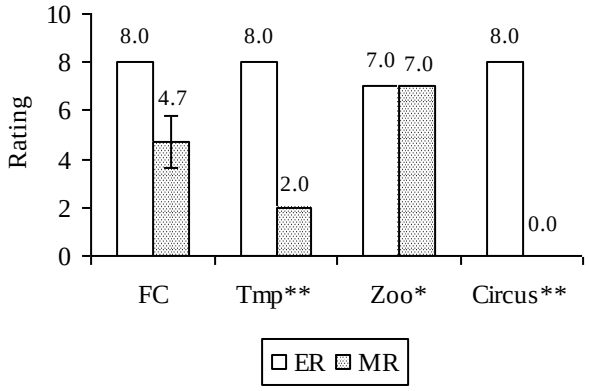
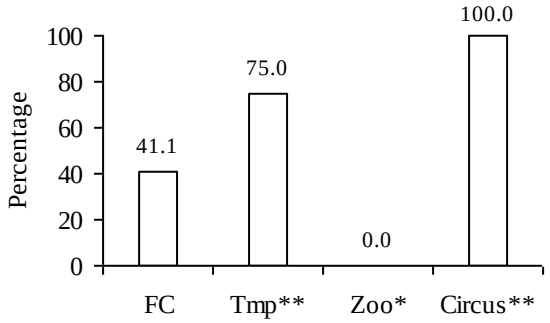


Figure 23a: Comparison of E-R and M-R for female reproductive status across observed management regimes



**: based on two sub-parameters only *: based on one sub-parameter only

Figure 23b: Percentagewise deviation from E-R for female reproductive status

Male reproductive status

Males in musth tend to be aggressive towards other males, actively search for females (Poole and Granli, 2009). It is said to be a period of heightened sexuality and aggression for male elephants. Fernando et al., (2008) observed males in musth in the wild to traverse greater distances.

- All six adult males in FCs exhibited signs of musth; no breeding opportunity was given for two of the males, no information available for the others; two had shown signs of aggression
- Musth, among male elephants with private owners, was seen in 86% (N= 21) of the observed animals; aggressive behaviour was seen in 60% (N= 25) of the elephants; 53% male elephants (N= 19) had not sired offspring; males were chained/ watered during this period
- Male elephants in temples were isolated/ watered/chained for the duration; were aggressive towards handlers/ strangers; 52% elephant s (N=) had not sired offspring

Figures 24a and 24b give the comparative rating across regimes and deviation from E-R respectively. The M-Rs are comparable across regimes due to the variation observed for the sub-parameters of this feature. This would imply absence of one/ more features suitable to the male elephants across all the regimes observed.

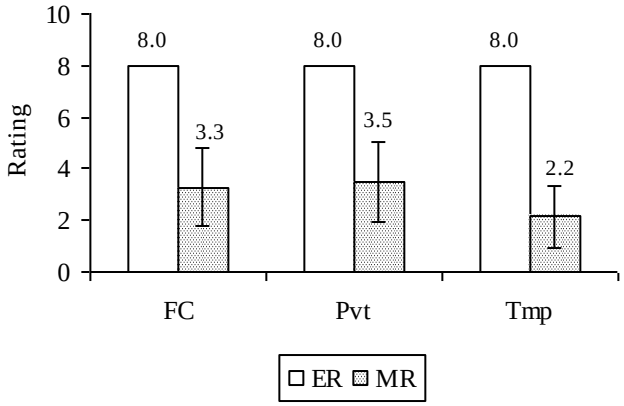


Figure 24a: Comparison of E-R and M-R for 'male reproductive status' across observed management regimes

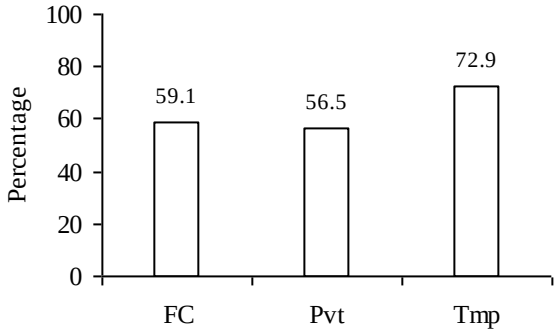


Figure 24b: Percentage wise deviation from E-R for 'male reproductive status'

Health status

Exposure of elephants to captive conditions makes them prone to diseases/ injuries as a consequence of management decisions or due to the prevalence of domestic livestock around the animals. Cheeran (1998) mentions the occurrence of foot diseases as being common for captive elephants. Regular implementation of prescribed veterinary protocols is equally important in maintaining health.

- Presence of intestinal worms, occurrence e of constipation/ indigestion and minor wounds was observed for FC elephants; medicated oil was applied on the body and deworming was practiced; none of the elephants were immunized; dung samples were tested once in three months/; blood/ urine samples annually
- Loss of vision, foot related problems (toe nail cracks/ foot rot) was observed for elephants with private owners; deworming was done for 47% of the elephants (N=

32); application of oil on the body was not done for any of the elephants (N= 32); samples of blood/ urine/ dung was not tested for any of the elephants (N= 34)

- For temple elephants, foot related injuries, loss of vision, colic among other diseases and injuries was observed; 33% (N= 18) temples did not deworm their elephants; sample testing of dung/ urine/ blood was reported for only one temple; Body measurements of elephants were not taken in 38% of observed temples (N=16)
- For the zoo elephant, deworming was practiced, but immunization and oiling was not done; samples of blood/dung/urine were tested once; body measurements were not taken
- Chronic wounds on fore-legs, foot-rot and anemia was apparent for the circus elephant; immunization/ application of oil or deworming was not done (see Figures 25a,b,c,d,e,f,g,h,iand j for the health status of elephants investigated from different management regimes in Kerala)

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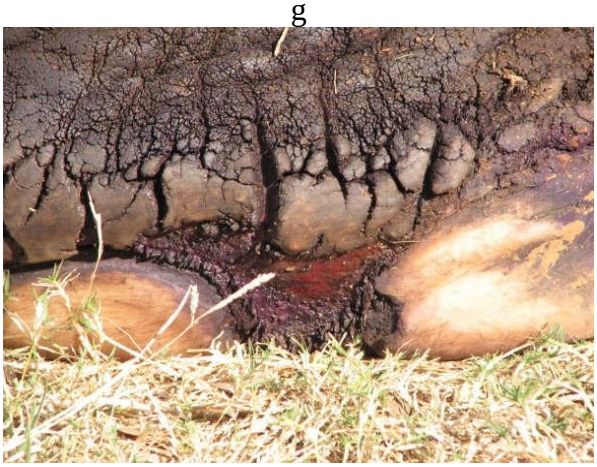

i

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Figures 25a,b,c,d,e,f,g,h,i and j: Health status of elephants observed from different management regimes in Kerala, injuries (including breaking of tusk) due to wild male attack to a male elephant in FC (a and b) unusual wart in elephant trunk and injury reported for an elephant in a private ownership (c and d); leg injuries due to chaining and other issues reported in elephants in temples (e,f,g,and h); foot and related problem reported in a circus elephant (i and j)

Figures 26a and 26b give the comparative rating across regimes and deviation from E-R respectively. FC elephants showed relatively low deviations from E-R indicating better health status and adherence to a prescribed veterinary protocol. The remaining regimes,

except for the circus, showed comparable deviations from E-R implying similarity in the features observed. The circus showed maximum deviation from E-R.

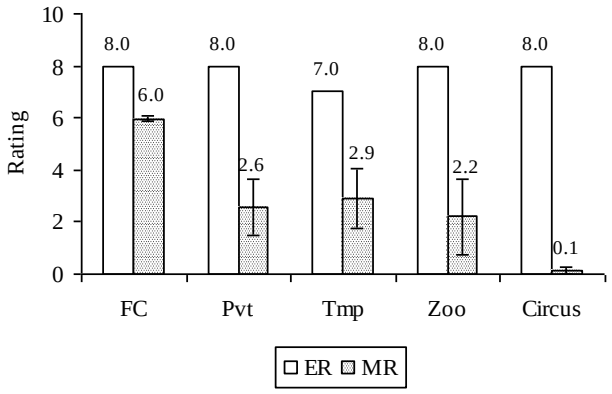

Figure 26a: Comparison of E-R and M-R for health status across observed management regimes

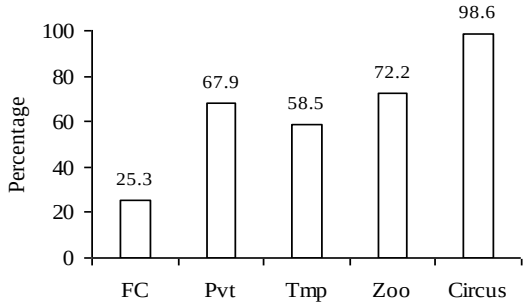

Figure 26b: Percentage wise deviation from E-R for health status

Veterinary personnel and infrastructure

Availability of veterinary personnel with relevant experience is integral to maintaining captive elephants' health. Poor infrastructure can lead to accidents and/ or loss of life in some cases.

- All elephants had access to a veterinary doctor; experience in treating elephants ranged from 5-24yrs; visit frequency by the doctor was daily to occasionally; accommodation for staff was not available for three FCs; veterinary care unit was not available in one FC
- All elephants with private owners had access to a veterinary doctor, years of experience ranged from 5- 35yrs; number of facilities available ranged from one – five; veterinary clinic facility was available for 70% of the elephants (N= 29)
- All temple elephants had access to veterinary doctors and veterinary assistants; veterinary care unit was available for 44% (N= 16) of the observed temples
- Veterinary doctor was available for the zoo elephant, frequency of visits was daily; a laboratory and out-patient veterinary care unit was available; health and service records were maintained

- Permanent veterinary personnel (doctor/ assistant) was not available for the circus elephant; veterinary care unit was also not available (see Figures 27a,b,c,d,e,f,g,h,i and j for the veterinary expertise and facilities available for different management regimes in Kerala)

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Figures 27a,b,c,d,e,f,g,and h: Veterinary expertise and facilities available for different management regimes in Kerala, Veterinary expertise and facilities available for elephants in Forest Camps (a,b,c and d), veterairy expertise available for elephants in Private ownership and temple (e,f, g and h; mahout adopting traditional medicine for treating foot-related problem (i and j)

Figures 28a and 28b give the comparative rating across regimes and deviation from E-R respectively. Deviations across regimes were comparable as variation in the M-Rs for each overlapped. This implies similarity in occurrence of conditions across the regimes. This was not the case for the circus elephant which showed a maximum deviation of 100% from E-R.

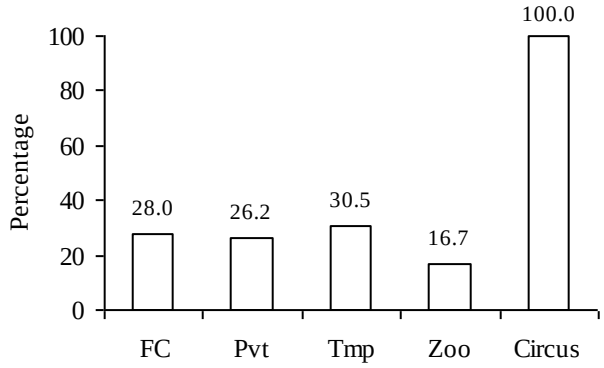


Figure 28a: Comparison of E-R and M-R for veterinary personnel and infrastructure across observed management regimes

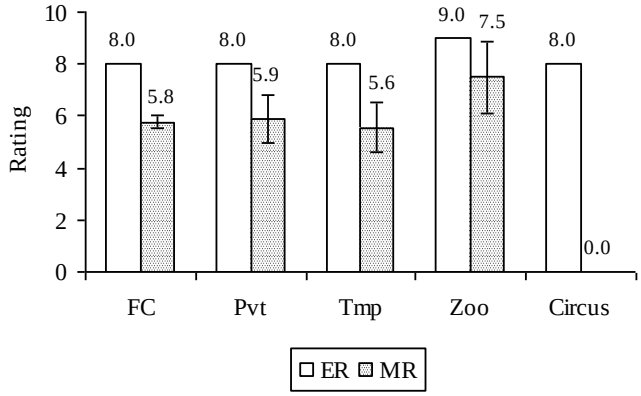


Figure 28b: Percentage wise deviation from E-R for veterinary personnel and infrastructure

Handler's status

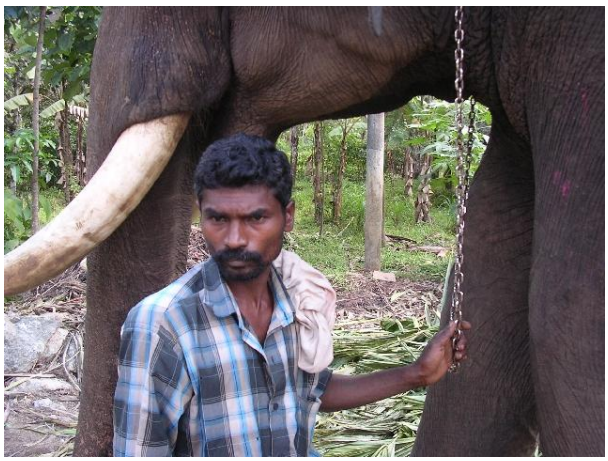
Mahouts/ cawadis form a significant part of the captive elephant systems. Their professional knowledge and socio-economic status have an effect not only on their own welfare but may also affect the way elephants are handled.

Professional experience

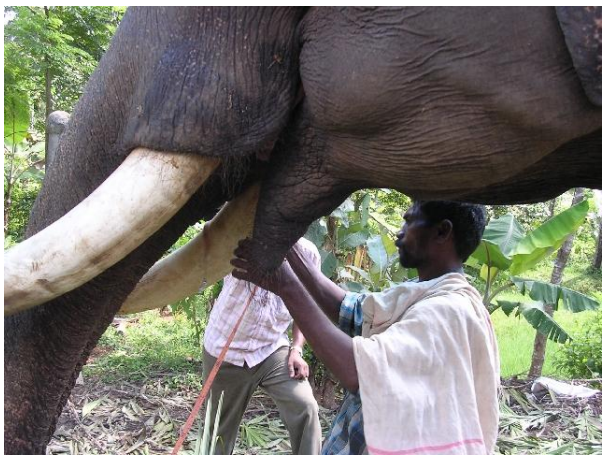
- For handlers of privately owned elephants, mean experience in this profession ranged from 1-35yrs; mean experience with a specific elephant ranged from 0.02-24y; 90% handlers opted for this profession out of interest
- Temple elephant handlers' experience in this profession ranged from 2-38y; 34% (N= 116) of handlers were not trained; mean hours spent with elephant while working was 17h while this duration during off-season was 6h (See Figures 29a, b,c,d,e,f,g and h for profiles of mahouts from different management regimes in Kerala)

a

b



c



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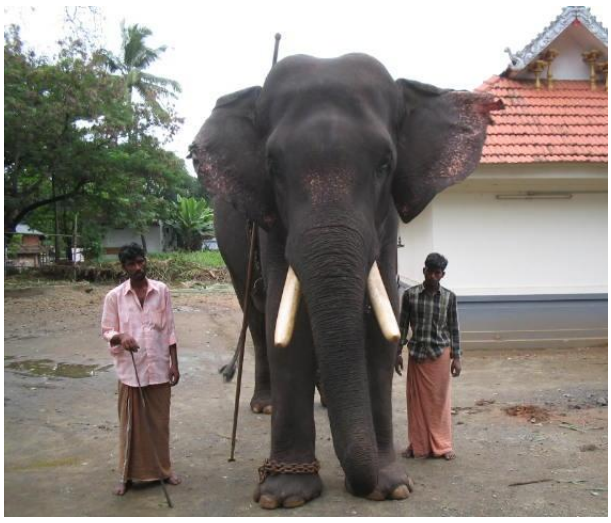

e

f

g

h

Figures 29a,b,c,d,e,f,g and h: profiles of elephant mahouts from different management regimes in Kerala; some job responsibilities of mahouts from forest camp (a and b); mahouts from private ownership (c and d), profiles and job responsibilities of mahouts from temples (e,f and g); well known elephant mahout Kaduva Velayudhan interacting with other mahouts on his experiences (h)

Figures 30a and 30b give the comparative rating across regimes and deviation from E-R respectively. The deviation from E-R was comparable across the regimes, indicating similarity in conditions; both showed relatively low deviations.

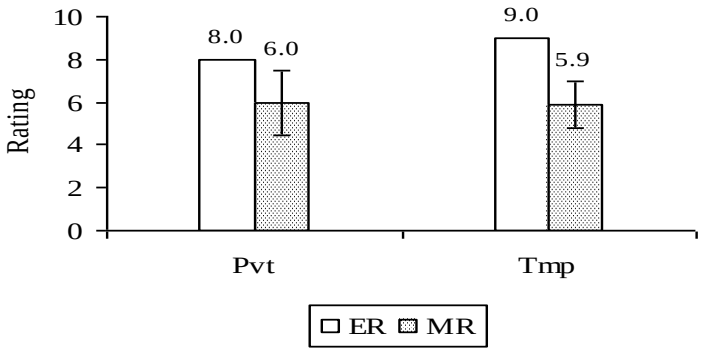

Figure 30a: Comparison of E-R and M-R for handlers' professional experience across observed management regimes

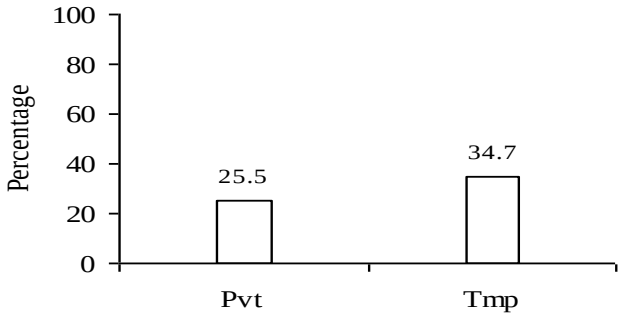

Figure 30b: Percentage wise deviation from E-R for handlers' professional experience

Socio-economic status

- Among FCs, most handlers consumed alcohol; mean annual salary drawn was Rs.54,000/- for temporarily employed handlers and Rs.1,20,000/- for the permanent handlers; insurance cover was provided by the forest department
- 67% of handlers (N= 18) with private owners came from a background not related to handling elephants; mean annual salary was Rs. 43,000/- ranging from Rs. 14,000 to 80,000/-; only 25% of handlers were covered by insurance (N= 20)[1]; 50% handlers consumed alcohol (N= 18), after work / on alternate days / weekly / occasionally
- Half of the observed temple handlers (N= 16) came from a background not associated with elephants; mean annual salary was Rs. 50,954/- ranging from Rs. 36,000/- to 84,000/-; 76% of handlers were said to consume alcohol, all after work hours; 7% (N= 123) of handlers were not covered by insurance

Figures 31a and 31b give the comparative rating across regimes and deviation from E-R respectively. The E-RS across regimes are comparable as they express variations, implying occurrence of similar conditions. The deviations were less than 50% for the regimes observed.

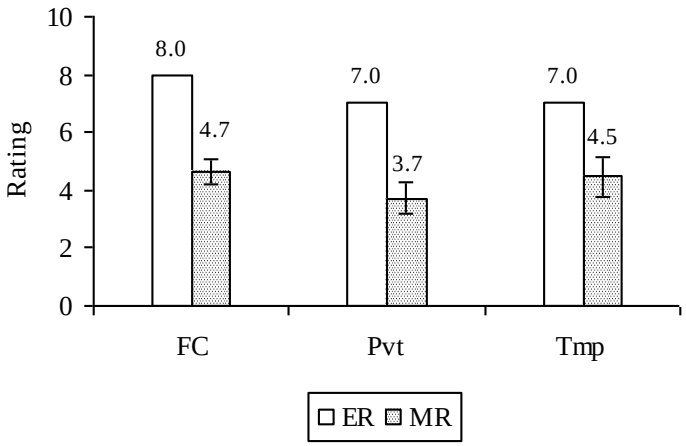

Figure 31a: Comparison of E-R and M-R for handlers' socio-economic status across observed management regimes

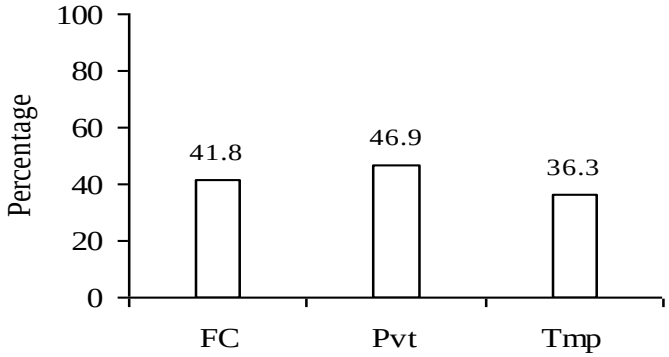

Figure 31b: Percentage wise deviation from E-R for socio-economic status

[1] By 2008, nearly all handlers were covered by insurance

Overall M-R for elephants, (Figure 32) compared across the regimes, shows the relative better welfare status of FC elephants. Variations observed in respective M-Rs do not seem to overlap with that of FC. This is borne by the fact that all the five FCs showed lesser percentage occurrence of higher quantum of deviation from E-R for the observed parameters/sub-parameters (Table -1).

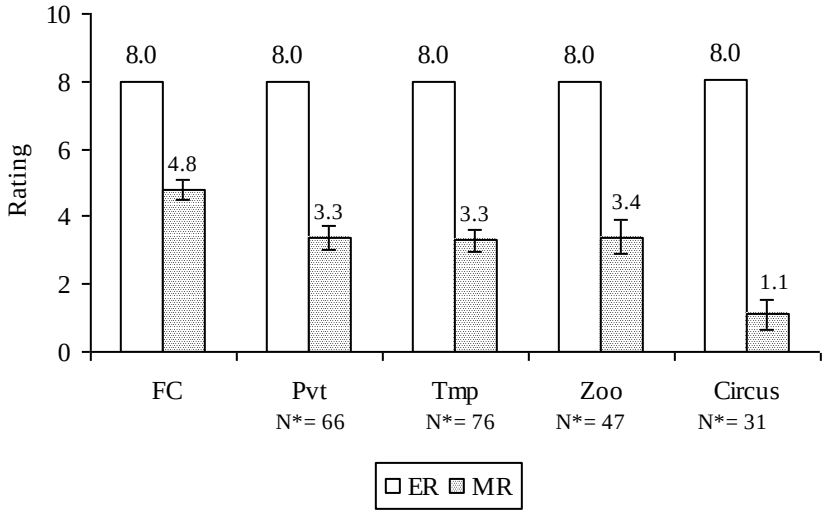

Figure 32: Comparison of E-R and M-R for across all observed parameters

The percentage of parameters accounting for more than 50% deviation from E-R was in the range of 55- 90% for all the other regimes (Table-1). Hence, more than half the observed parameters/ sub-parameters deviated by 50% or more from norms prescribed by the team of experts. E-Rs for Private owners, temples and the zoo were comparable, implying similarity in the conditions.

Relatively low E-R was seen for the circus elephant, showing poorer welfare conditions as compared to the other regimes.

Table-1: Distribution of 50% or more deviation from E-R across regimes

Management regime	**Percentage occurrence of sub-parameters/ parameters with 50% or more deviation from E-R**	**Total number of sub-parameters/ parameters observed**
Forest Camps (FCs)	Aranyakavu 49%	N*= 47
	Kodanad 52%	N*= 54
	Konni 48%	N*= 58
	Kottur 42%	N*= 50
	Muthanga 34%	N*= 58
Private owners	62%	N*= 65

Temples	55%	N*= 76
Zoo	66%	N*= 47
Circus	90%	N*= 31

Discussion

Maintaining non-domestic animals such as elephants in captivity obligate the provision of features of biological and behavioural importance to the animal (Veasey, 2006). Welfare status of elephants in captivity has been assessed by comparing the captive state with those observed for wild elephants.

Feature/s contributing to poor welfare status common to all regimes:

- Chaining of elephants: all elephants were subject to chaining for various durations. This comprehensively restricted access to whatever resources were available for the elephant such as being able to interact through touch with neighboring elephants, selecting a suitable place to sleep, exercising options to perform a species-typical activity
- Social interaction was limited across all regimes either due to chaining of elephants (FCs) or due to absence of other elephants (zoo/ circus). For elephants with private owners/ temples, interaction was severely restricted due to nature of their work schedule or absence of other elephants.
- Food provisioning: Opportunity to browse/ graze in vegetated areas was absent for most elephants across all regimes. Stall feeding was the common practice. Foraging is a major activity for wild elephants (Sukumar, 2006); its absence will consequently affect related features such as walking (exercise), opportunity to learn for younger animals, and will remove a source of psychological stimulation
- Male reproductive behaviour was severely restricted due to the practice of chaining elephants in musth

Features contributing to poor welfare status common to some regimes:

- Except for FCs, physical space available was limited for all other regimes. Open type shelters were not equipped with sufficient vegetation to provide for shade during the day
- Hygiene was poor at the tethering places for elephants of temples and private owners
- Rivers/ streams were not available for most elephants with private owners/ temples/ zoo and circus. This was available for most FC elephants
- Opportunity to walk was limited either due to being chained (FCs), due to work schedule (Private/ temple/ circus elephants) or due to daily routine (zoo); the elephants with private owners and temples were walked on unsuitable surfaces such as tarred roads covering long distances during festivals
- Stereotypic behaviour was observed in all regimes except for the zoo elephant; the number of elephants showing this behaviour was highest for temple elephants
- Work performed by temple/ private and the circus elephant was alien to its natural behaviour. Timber work, if performed for long durations, can be physically exhausting for the elephants (Saseendran, et al., 2009)

- Female reproductive status was poor across all regimes either due to fewer opportunities (FCs) or due to absence of members of opposite sex/ restrictions on movement (temple/ private owner / circus).
- Loss of vision was reported for some elephants in their prime (temples/ private owners), a factor that needs further investigation; foot problems observed in temples/ private owners/ circus elephants
- Prescribed veterinary protocol such as deworming/ immunization/ sample testing of dung/ urine/ blood was not done for most elephants with private owners/ temples /circus

Elephant Handlers

- Professional experience in this field and number of years with a specific elephant did not show similarity, implying change of handlers for elephants with private owners/ temples
- Mean annual salary drawn was higher for FC handlers than temple/ private owners
- All FC handlers were covered by insurance; this was not the case for temple/ private owners
- Alcohol consumption was prevalent among handlers across all regimes observed
- Poorly trained handlers

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Section 2:
Captive Elephants in Forest camps

Section 2a:
Captive Elephants in Muthanga Forest Camp

Executive summary

The camp with captive elephants in Muthanga, Kerala, houses male elephants. These elephants are used in human-wild elephant conflict situations. The maintenance of only male elephants in a single location can be challenging if the positive welfare status of the elephants is to be maintained.

The objective of the investigation is to assess the welfare status of captive elephants and assess the socio-economic status of handlers in Muthanga Forest Camp.

The welfare was assessed based on a rating scale. The rating scale from unsuitable conditions to suitable conditions was used to assess the welfare status of captive elephants and their handlers. The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter, defined as Experts' Rating (E-R). Mean Rating (M-R) representing the actual situation existing for the elephant/s was obtained through a ground survey. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm

Muthanga FC maintained three male tuskers, aged 15, 20 and 55y. There were no female elephants. Of the three elephants, two had been rescued as calves from Wynad district. One elephant, the 20 year old male, was born in captivity. M-R was 4.0 indicating a deviation of 33% from E-R.

All three elephants were maintained for their use as *Koonkie* (*Kumki*) in forest conditions. Occasionally used in tourism related work. M-R was 5.0 showing 38% deviation from E-R. All elephants could free range in forest in the morning, chained from 5p.m. to 7:30 a.m. to a tree with earthen flooring. M-R was 7 implying a deviation of 9.4% from E-R.

Drinking/ bathing water source was a stream. Distance to water source was 0m while free-ranging and less than 500m when chained. Elephants were bathed once every day for a duration of 1-1.5 hrs; coir and coconut husk was used as scrub material. M-R was 6 with a deviation of 23% from E-R.

The elephants in the FC were allowed to interact while free-ranging from 8 a.m. to 6 p.m. Number of individuals was three and all were adult males. M-R was 4 showing a deviation of 51% from E-R.

All elephants were chained by their legs with a plain chain, from 6 p.m. to 7a.m. After 9a.m., they were let loose in forest to free range with drag chain; brought back to the camp after 4 p.m. M-R was 4 showing a deviation of 48% from E-R.

All three elephants were described as timid to aggressive, occasionally undependable, and partially aggressive to other elephants or people. None of the elephants exhibited stereotypy. M-R was 7with a deviation of 12.5% from E-R.

The elephants were maintained for use as *Koonkies*/ *Kumki.* Occasionally used for tourism. M-R was 6.7 (SE= 1.5, N*= 5) showing a deviation of 16.3% from E-R.

All the elephants were given stall feed and allowed to graze/ browse in forest. Food provided was: grass, concentrate food consisting of a mixture of horse gram (*Macrotyloma uniflorum*), rice (*Oryza* sp.), wheat (*Triticum aestivum*), ragi (*Eleusine coracana*), salt and mineral mixture. M-R was 6 with a deviation of 20% from E-R.

All the elephants exhibited musth. During musth, the elephants were chained with a long chain, not isolated. A 15y old male was reported to have injured a mahout during musth M-R was 3 with a deviation of 66.7% from E-R.

Occasional lacerated wounds and occasional mud-eating were observed. Medicated oil was applied around the feet. Dung samples were examined once in three months and blood/ urine samples annually. M-R was 6 showing a deviation of 9% from E-R.

The elephants had access to a veterinary doctor with 5 yrs of experience in treating elephants. Health and service records were maintained. M- R was 5 with a deviation of 32.5% from E-R.

The handlers' age was in the range of 15-20 yrs. All were tribals and annual salary was Rs.54, 000/-. All were covered by insurance, paid by the forest department. The handlers used ankush and stick to control their elephant. All consumed alcohol occasionally. M-R was 4 with a deviation of 39.2% from E-R.

Overall M-R for elephant welfare status was 6 showing a deviation of 29.3% from E-R.
Maximum occurrence (55%) of minimum deviation (0%) was seen, implying occurrence of near natural conditions. Among the parameters showing minimum deviation, however, a large number related to veterinary care (31%), implying a fairly optimum level of veterinary facilities and care.

Introduction

The camp with captive elephants in Muthanga, Kerala, houses male elephants. These elephants are used in human-wild elephant conflict situations. The maintenance of only male elephants in a single location can be challenging if the positive welfare status of the elephants is to be maintained.

Objective

- To assess the welfare status of captive elephants through a survey of the existing physical, social, psychological and reproductive features
- To assess the socio-economic status of handlers as they are an essential part of a captive elephant system

Method

The biological and ecological needs of captive elephants cannot be considered to be different from those of their wild counterparts as elephants have not been selectively bred or genetically altered in captivity. Thus, the features observed for wild elephants have been used as a benchmark with which to compare the needs of captive elephants. Welfare status of captive elephants has been assessed using this comparison: greater deviation from the wild implies poorer welfare in captivity. This comparison has been facilitated by a rating scale developed by a team of experts from different fields.

Rating method

The rating scale from zero (unsuitable conditions) to ten (suitable conditions) was used to assess the welfare status of captive elephants and their handlers. Experts (both wild and captive elephant specialists, wildlife veterinary experts, managers from protected areas, managers responsible for both wild and captive elephants and other wildlife, personnel from welfare organisations and elephant handlers) were invited to assess the welfare based on different parameters and their significance through an exclusive workshop conducted on the subject (Varma, 2008; Varma, et al., 2008; Varma and Prasad, 2008). Experts rated a total of 114 welfare parameters covering major aspects of captivity.

- The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter. For example mean expert rating of 8.0 (SE= 0.5, N=29) for a parameter 'floor' and 9.0 (SE=0.4, N=31) for 'source of water' was arrived at from the ratings suggested by each expert by averaging across all the experts' values.
- A mean rating for each parameter, across all the participating experts, has been used as the Experts' Rating (E-R) which represents the importance attached to a parameter i.e., for a parameters with 8.0 as the maximum value, only 2.0 (25%) deviation and parameter with maximum value of 9.0, only 1.0 or 10% from the prescribed norm is considered acceptable.
- For example, if an elephant is exposed only to natural flooring, the animal receives a rating of 8 and for entirely unnatural flooring the value is 0; if animal is exposed to both natural and unnatural flooring, the value is 4 (as 8+0/2= 8/2= 4). If an elephant is exposed to a natural water source, such as a river, it receives a value of 9; if the source of water is large lakes or reservoirs, it gets 4.5. A value of 3.5 is assigned for

small water bodies like tanks and ponds. Tap water (running) gets 2.5 and if only buckets, pots, and tankers are in use, then the allocated value is 0.5. This rating is then averaged across all individuals in that institution to get a Mean Rating (M-R) for that feature. Thus M-R represents the actual situation existing for the elephant/s.

- Therefore, using the maxima given by experts as a base, a rating scale starting from zero to the particular maximum value for that parameter has been used and the data for each animal was collected, in a given regime (for example, forest camp or temple).
- In this investigation, variables which represent a common feature of the captive situation have been grouped to form a parameter. The variables have been termed sub-parameters. For example, the variables shelter type, shelter size, floor type in the shelter; all represent different aspects of the physical space provided to the elephant. Hence, they are grouped together to form the parameter "Shelter" and each constituent variable is a sub-parameter. In this investigation, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters. The Mean Rating (M-R) for a parameter is the mean of M-Rs across related sub-parameters and denotes welfare status of existing conditions on the ground for the particular parameter.
- The number of such related parameters (sub-parameters) varies for each regime.
- Results have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the parameters observed. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.
- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) have been used to indicate the professional/ socio-economic status, of value to the handler and his elephant.
- N* refers to number of sub-parameters observed. N refers to number of individuals.

Results

Muthanga FC maintained three male tuskers, aged 15, 20 and 55y. There were no female elephants.

Source

The change undergone by elephants when shifting from the wild to a captive situation is greater than one undergone if the elephant is captive born.

- Of the three elephants, two had been rescued as calves from Wynad district
- One elephant, the 20y old male, was born in captivity

M-R was 4.0 (SE= 1.3, N= 3) indicating a deviation of 33% from E-R.

Purpose of keeping

The living conditions of elephants is somrtimes dependant upon why they are being kept—un-natural conditions may exist if the elephant is maintained purely for revenue generation.

- All three elephants were maintained for their use as *Koonkie* (*Kumki*) in forest conditions

- Occasionally used in tourism related work

M-R was 5.0 (SE= 0.0, N= 3) showing 38% deviation from E-R.

Shelter

Wild elephants are known to traverse kilometers across varied vegetation as they forage (Sukumar, 1991); males covering greater area during musth period (Fernando, et al., 2008).

- All elephants free range in forest in the morning
- Chained from 5p.m. to 7:30a.m. to a tree with earthen flooring
- Tethering place cleaned once daily from 7a.m. to 8a.m.

M-R was 7.3 (SE= 0.9, N*= 5) implying a deviation of 9.4% from E-R. Figures 1 and 2 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

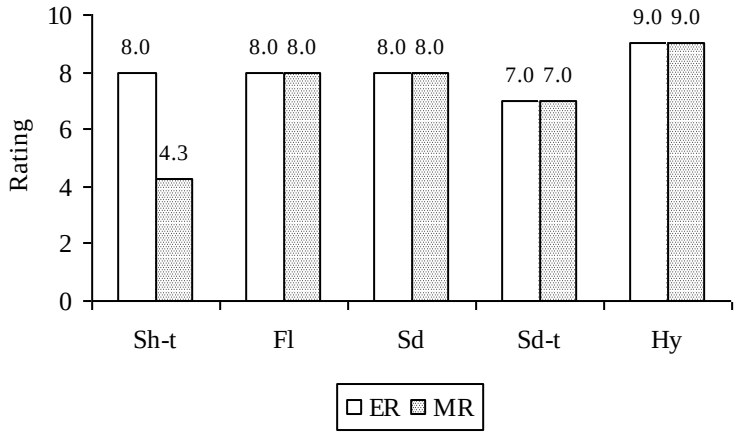
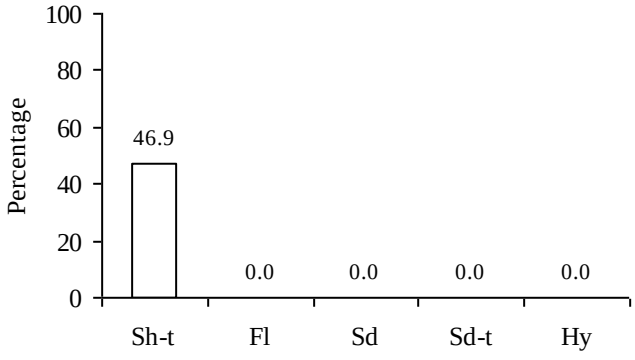


Figure 1: Comparison of E-R and M-R for 'shelter' sub-parameters



Sh: Shelter type Fl: Floor Sd: Shade availability Sd-t: Shade type
Hy: Maintenance of hygiene

Figure 2: Percentage wise deviation from E-R for 'shelter' sub-parameters

Water and related parameters

Exposing elephants to high temperatures without access to water can be damaging to its health. Water sources should be provided for performance of species-typical activities.

- Drinking/ bathing water source was a stream
- Distance to water source was 0m while free-ranging and less than 500m when chained
- Elephants were bathed once everyday for a duration of 1-1.5h; coir and coconut husk was used as scrub material

M-R was 6.2 (SE= 1.0, N*= 7) with a deviation of 23% from E-R. Figure 3 and 4 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

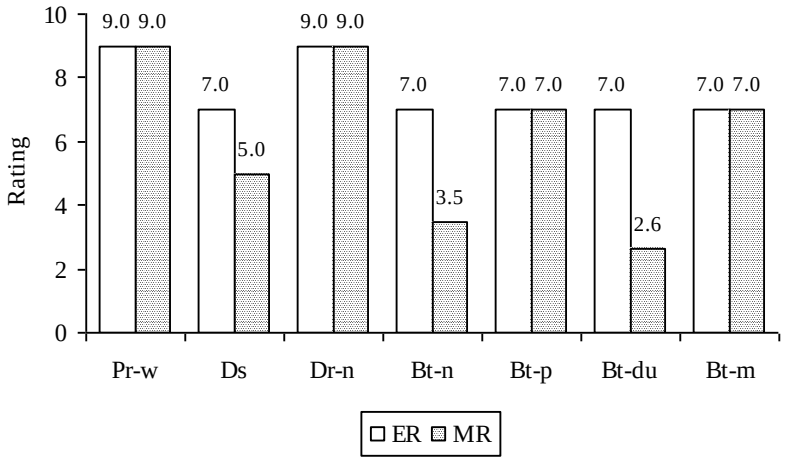
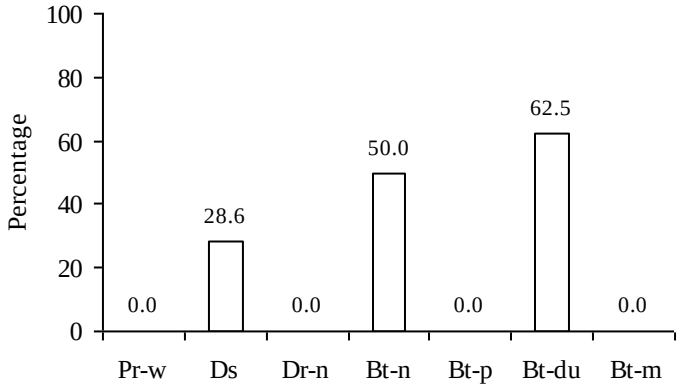


Figure 3: Comparison of E-R and M-R for 'water' sub-parameters



Pr-w: Availability of perennial source of running water Ds: Distance to water source
Dr-n: Number of times drinking water Bt-n: Bathing number of times Bt-p: Bathing place
Bt-du: Bath duration B t-m: Bathing materials

Figure 4: Percentage wise deviation from E-R for 'water' sub-parameters

Sleep

Provision of suitable sleeping conditions is important as hard surfaces/ restricted movement may have long-term effects on health.

- All elephants were chained at night with a 1m chain
- Flooring was earthen

M-R for sleeping place was 4.0 (SE= 0.0), Percentage wise deviation from E-R was 50.0; M-R for sleep area (size) was 0.0 (SE= 0.0), Percentage wise deviation from E-R was 100%.

Walk

Wild elephants have been observed to be active most parts of a day (Poole and Granli, 2009), covering vast distances as they forage or search for mates.

- All elephants were allowed to free-range in forest from 9a.m. to 5 p.m.

M-R was 6.7 (SE= 2.3, N*= 3) with a deviation of 16.7% from E-R. Figure 5 and 6 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

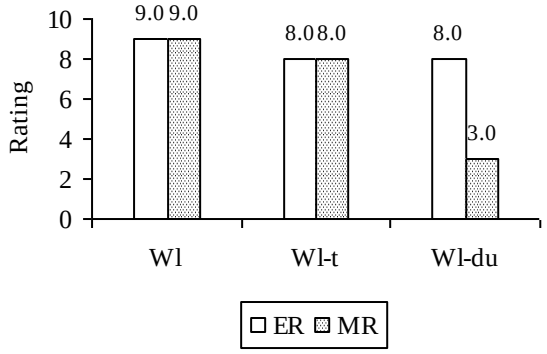
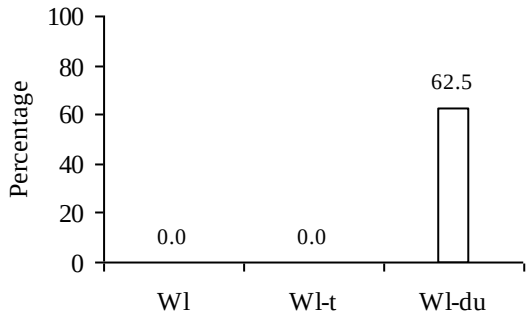


Figure 5: Comparison of E-R and M-R for 'walk' sub-parameters



Wl: Opportunity to walk Wl-t: Time of walk Wl-du: Walk duration

Figure 6: Percentage wise deviation from E-R for 'walk' sub-parameters

Social interaction

The social nature of elephant herds is well documented (Poole and Moss, 2008). Male elephants, though known to disperse from their natal herds, need to learn the strengths and weaknesses of other males. This can be learnt in a social environment. A social environment also includes the need for females to be present for the male to express species-typical behaviour.

- The elephants in the FC were allowed to interact while free-ranging from 8a.m. to 6p.m.
- Number of individuals was three and all were adult males.

M-R was 3.9 (SE= 2.6, N*= 3) showing a deviation of 51% from E-R. Figures 7 and 8 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

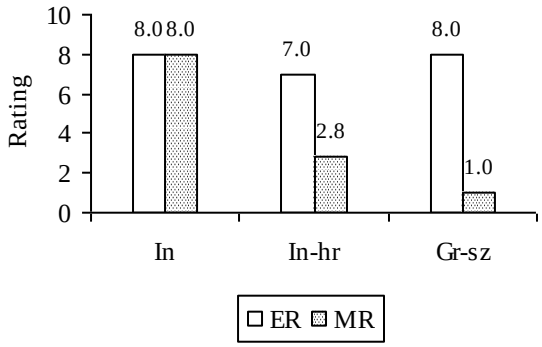
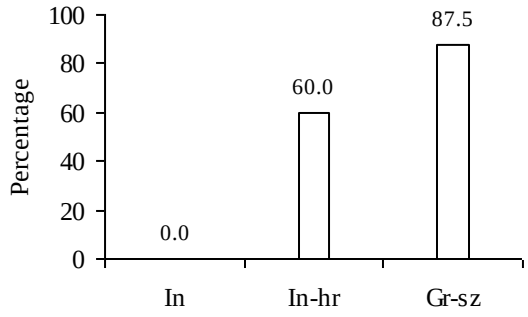


Figure 7: Comparison of E-R and M-R for 'Interaction' sub-parameters



In: Opportunity for interaction In-hr: Hours of interaction Gr-sz: Group size

Figure 8: Percentage wise deviation from E-R for 'interaction' sub-parameters

Chaining

Kurt and Garai (2007) mention the negative effects of chaining on elephant health and psychology.

- All elephants were chained by their legs with a plain chain
- Size of the chain was 8mm for two elephants and 10mm for the 55y old male
- The elephants were chained from 6p.m. to 7a.m.
- After 9a.m., let loose in forest to free range with drag chain; brought back after 4p.m.

M-R was 4.2 (SE= 0.9, N*= 6) showing a deviation of 48% from E-R. Figures 9 and 10 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

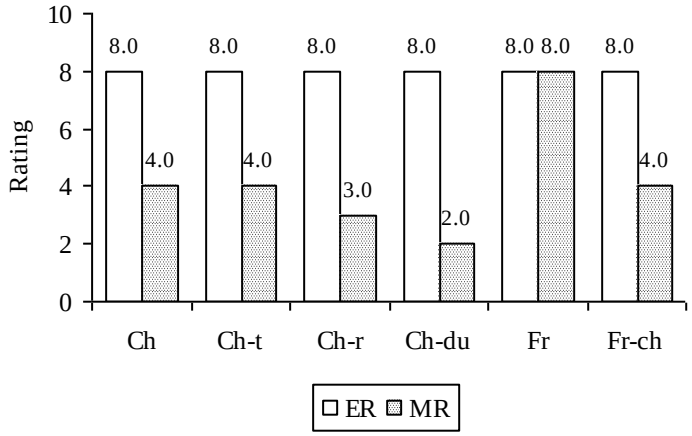
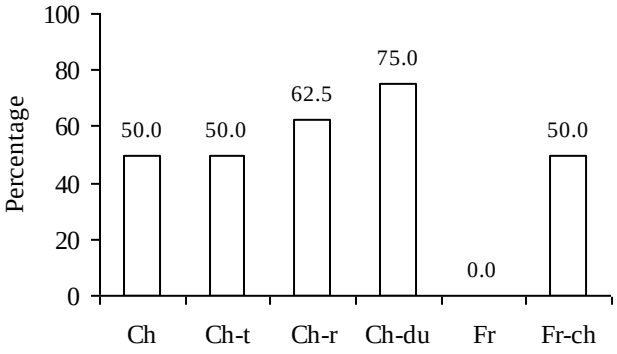


Figure 9: Comparison of E-R and M-R for 'chaining' sub-parameters



Ch: Chaining status Ch-t: Chain type Ch-r: Chaining region
Ch-du: Chaining duration Fr: Opportunity to free range Fr-ch: Chain type during free-ranging

Figure 10: Percentage wise deviation from E-R for 'chaining' sub-parameters

Observed behaviour

An overall calm behaviour in elephants may help in easy handling by their mahouts/ cawadis. Occurrence of stereotypy could be considered an indicator of deviant behaviour.

- All three elephants were described as timid to aggressive, occasionally undependable, partially aggressive to other elephants or people

- There were no incidents of injury to people, except for a male in musth, which had injured its mahout
- None of the elephants exhibited stereotypy

M-R was 7.0 (SE= 1.9, N*= 3) with a deviation of 12.5% from E-R. Figure 11 and 12 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

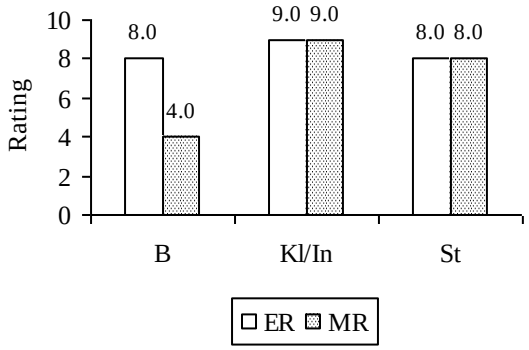
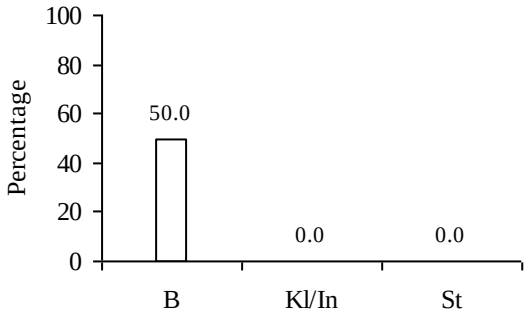


Figure 11: Comparison of E-R and M-R for behaviour sub-parameters



B: Observed behaviour Kl/In: Incidents of killing/ injury by elephants St: Occurrence of stereotypy

Figure 12: Percentage wise deviation from E-R for behaviour sub-parameters

Work

Work defines the environment in which captive elephants live: when elephants are used for work that involves performance of alien behaviours, it may be in a non-nautral physical environment; conversely, performance of natural behaviours may involve provision for a representative natural environment.

- The elephants were maintained for use as *Koonkies*/ *Kumki*
- Occasionally used for tourism
- Forest shade was available while working
- Water and rest was provided while working

M-R was 6.7 (SE= 1.5, N*= 5) showing a deviation of 16.3% from E-R. Figure 13 and 14 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

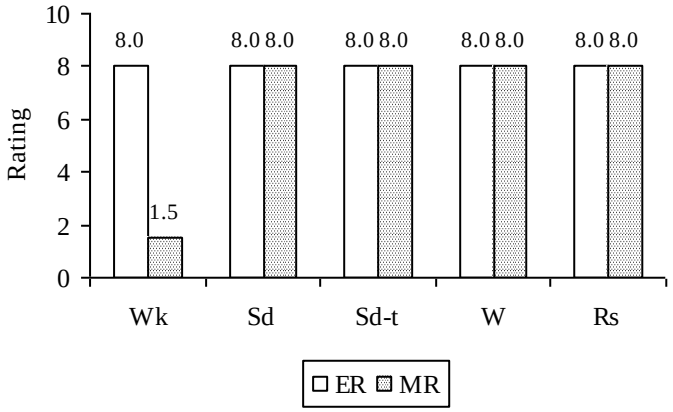
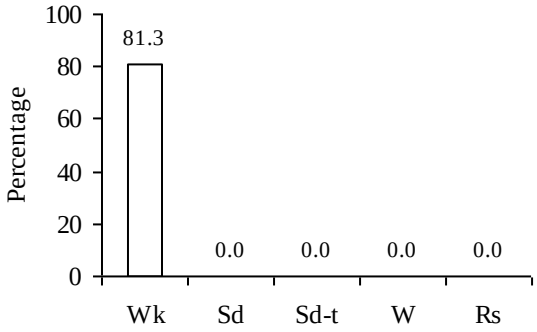


Figure 13: Comparison of E-R and M-R for 'work' sub-parameters



Wk: Work type Sd: Shade availability Sd-t: Shade type W: Water availability Rs: Rest availability

Figure 14: Percentage wise deviation from E-R for 'work' sub-parameters

Food

McKay (1973) and Shoshani and Eisenberg (1982) state that wild elephants feed on diverse plant species; the food is manipulated using trunk/ feet or teeth (Kurt and Garai, 2007). For captive elephants, with restricted movement, managerial procedures such as maintenance of ration charts, provision of supplement food play an important role in maintaining health.

- All the elephants were given stall feed and allowed to graze/ browse in forest
- Stall feeding duration was from 9a.m. to 9:30a.m. and all night

- Food provided was: grass, concentrate food consisting of a mixture of horse gram (*Macrotyloma uniflorum*), wheat (*Triticum aestivum*), rice (*Oryza* sp.), ragi (*Eleusine coracana*), salt and mineral mixture
- Ration chart was maintained

M-R was 6.4 (SE= 1.4, N*= 5) with a deviation of 20% from E-R. Figures 15 and 16 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

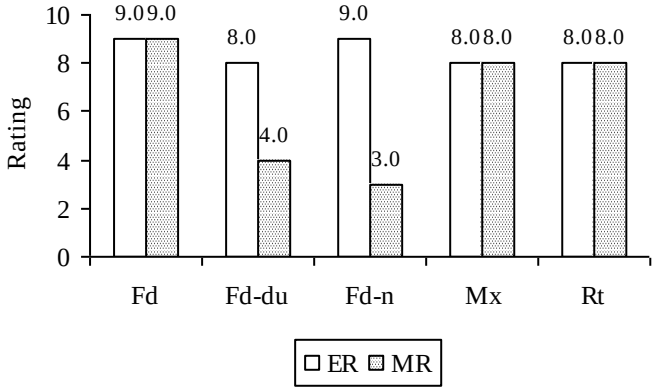
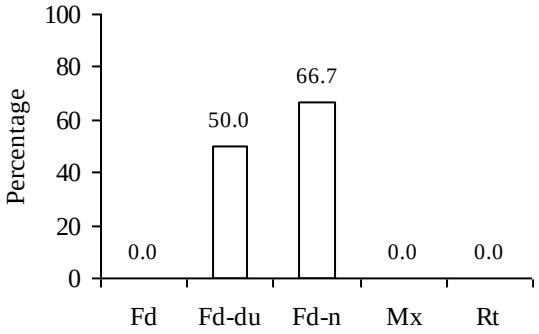


Figure 15: Comparison of E-R and M-R for 'food' sub-parameters



Fd: Food provisioning type Fd-du: Feeding duration Fd-n: Number of stall fed items Mn: Provision of mineral mixture
Rt: Usage of ration chart

Figure 16: Percentage wise deviation from E-R for 'food' sub-parameters

Male reproductive status

Welfare implications for adult male elephants are of two kinds: occurrence of musth in captivity and opportunity for expression of species-typical behaviour in a reproductive context.

- All the elephants exhibited musth
- Whether allowed exposure to females for mating/ sired offspring was not known
- During musth, the elephants were chained with a long chain, not isolated

- A 15y old male was reported to have injured a mahout during musth

M-R was 2.7 (SE= 3.3, N*= 3) with a deviation of 66.7% from E-R. Figures 17 and 18 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

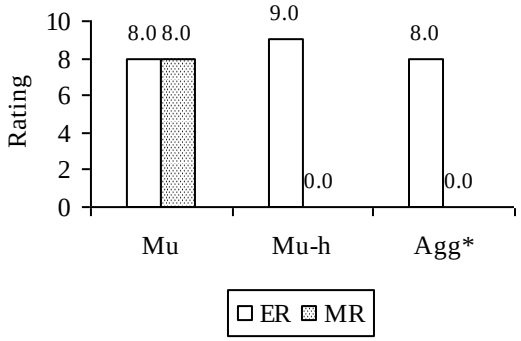
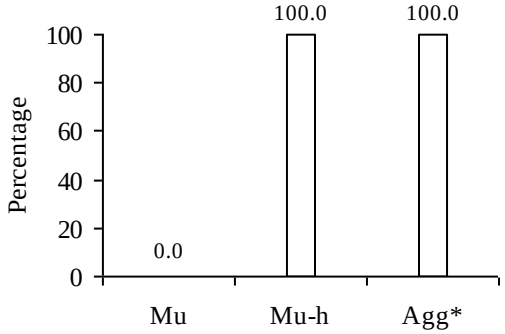


Figure 17: Comparison of E-R and M-R for 'male rep status' sub-parameters



Mu: Occurrence of musth Mu-h: Handling of musth Agg: occurrence of aggression during musth
*: observed for only one elephant

Figure 18: Percentage wise deviation from E-R for 'male reproductive status' sub-parameters

Health status and veterinary protocol

An ill-suited captive environment may lead to ill-health: hard floors are associated with foot problems (Benz, 2005); exposure to domestic livestock may cause related diseases.

- The following conditions were observed: occasional lacerated wounds, occasional mud-eating
- Deworming was done once in six months or annually
- None of the elephants were immunized
- Oil was applied around the feet
- Dung samples were examined once in three months and blood/ urine samples annually
- Body measurements were taken annually

M-R was 6.4 (SE= 0.9, N*= 9) showing a deviation of 9% from E-R. Figures 19 and 20 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

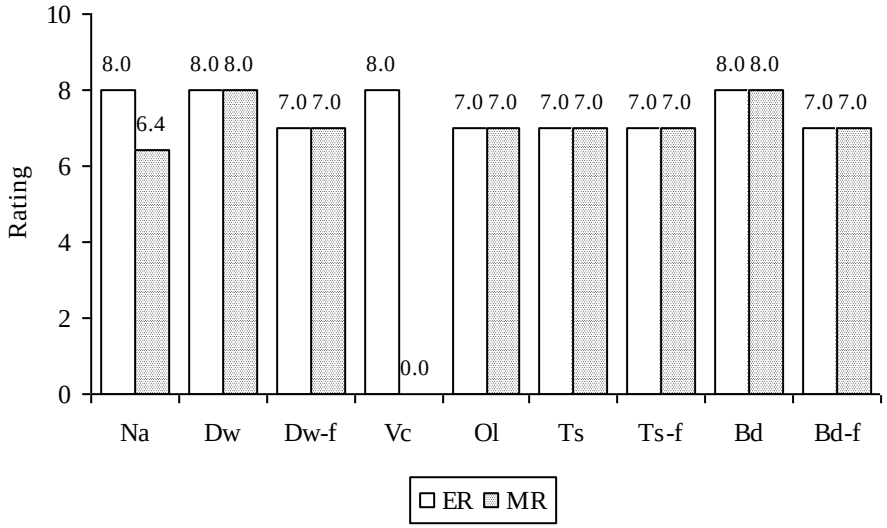
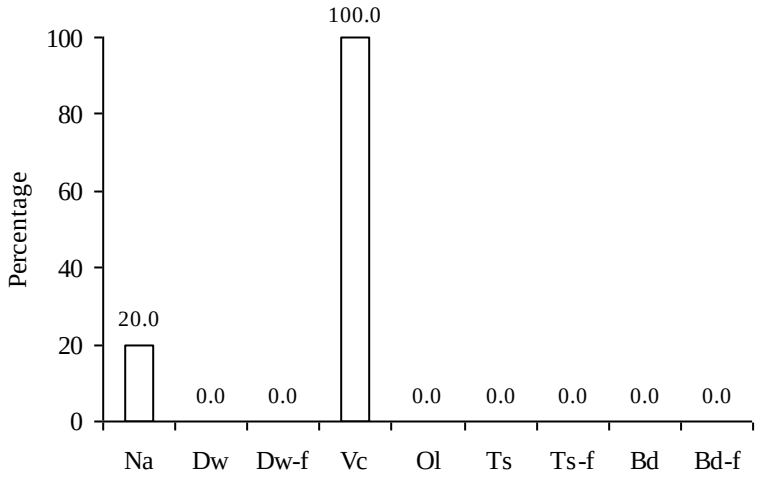


Figure 19: Comparison of E-R and M-R for 'health status' sub-parameters



Na: Nature of disease/ injury Dw: Deworming status Dw-f: Frequency of deworming
Vc: Vaccination status Ol: Oiling status Ts: Sample tests of dung/ urine/ blood Ts-f: Frequency of sample testing
Bd: Body measurements taken Bd-f: Frequency of body measurements

Figure 20: Percentage wise deviation from E-R for 'health status' sub-parameters

Veterinary personnel and facilities

Presence of and access to veterinary personnel with relevant experience is important in maintaining health.

- The elephants had access to a veterinary doctor with 5y experience in treating elephants
- Veterinary assistant was not available
- Health and service records were maintained
- Cooking shed, food preparation hall, provision shed, kraals, animal stand and camp site were available; accommodation for staff was not available

M- R was 5.4 (SE= 1.9, N*= 5) with a deviation of 32.5% from E-R. Figures 21 and 22 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

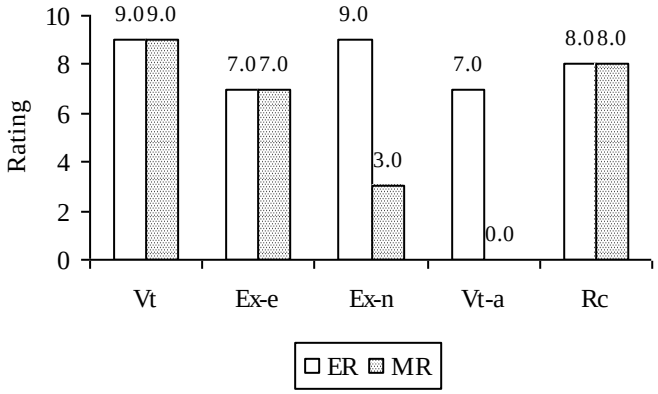
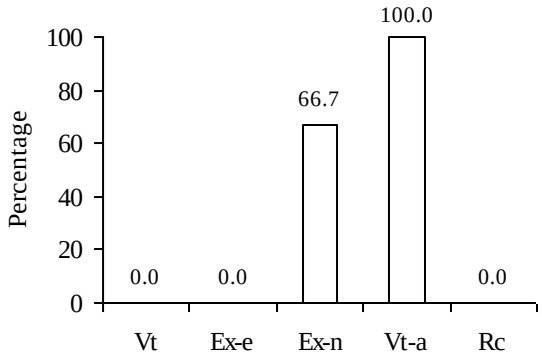


Figure 21: Comparison of E-R and M-R for 'veterinary personnel' sub-parameters



Vt: Availability of veterinary doctor Ex-e: Experience with elephants Ex-n: Number of years of experience
Vt-a: Availability of veterinary assistant Rc: Maintenance of records

Figure 22: Percentage wise deviation from E-R for 'veterinary personnel' sub-parameters

Handler's socio-economic status

Handlers from a traditional background of dealing with elephants may have more knowledge about elephant life, or having relatives in this profession may help in discussing professional conflict issues. Insufficient remuneration may indirectly affect elephant care.

- The handlers' age was in the range of 15-20y
- All were tribals, with a family occupation of *coolie* (labourer)
- Education was upto the primary school level
- Annual salary was Rs.54,000/-
- The handlers spent 11-12h with their elephants, used ankush (*Thotti*) and stick to control their elephant
- All were covered by insurance, paid by the forest department
- All consumed alcohol, occasionally
-

M-R was 4.3 (SE= 1.4, N*= 7) with a deviation of 39.2% from E-R. Figures 23 and 24 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

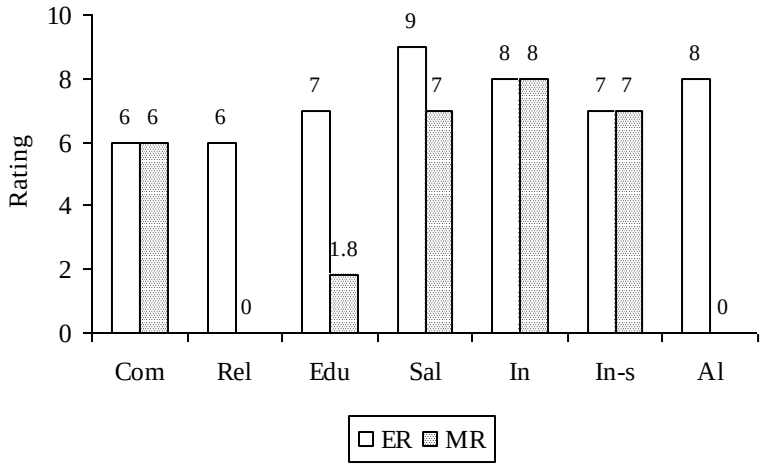
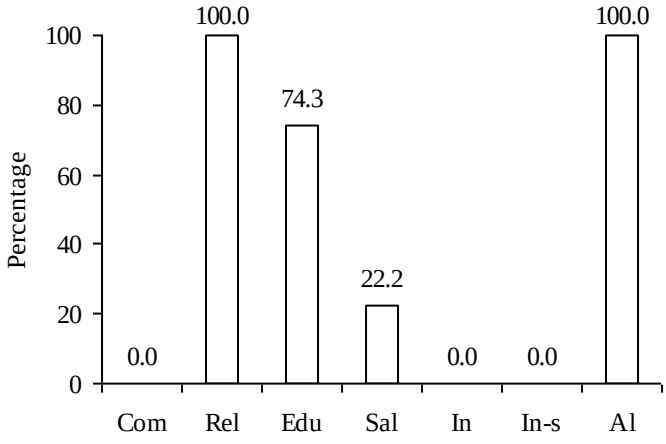


Figure 23: Comparison of E-R and M-R for handlers' 'socio-economic status' sub-parameters



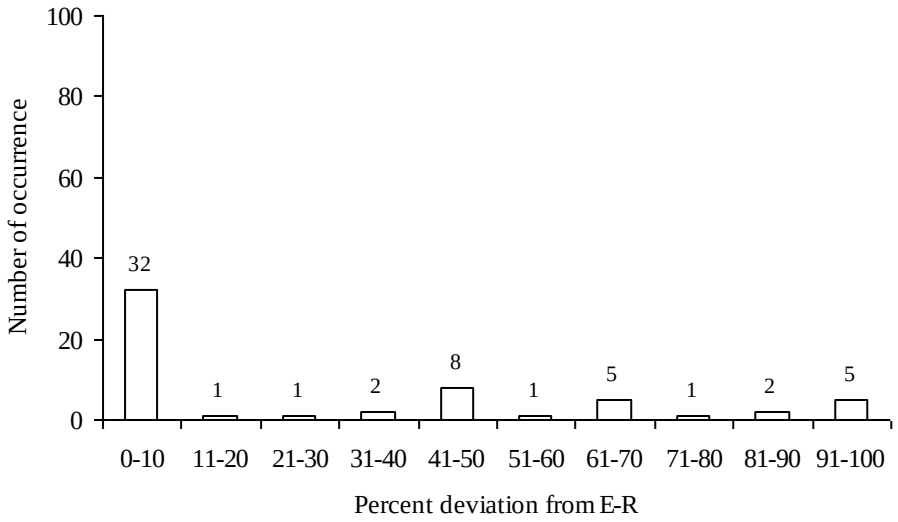
Com: Community Rel: Relatives in this profession Edu: Education level Sal: Salary drawn
In: availability of insurance In-s: Source of insurance Al: Consumption of alcohol

Figure 24: Percentage wise deviation from E-R for handlers' 'socio-economic status' sub-parameters

Overall Welfare Status

Overall M-R for elephant welfare status was 5.7 (SE= 0.4, N*= 58) showing a deviation of 29.3% from E-R. Figure 25 gives the occurrence of different classes of deviation across all the observed parameters. Maximum occurrence (55%) of minimum deviation (0%) was seen, implying occurrence of near natural conditions.

Among the parameters showing minimum deviation however, a large number related to veterinary care (31%), implying a fairly optimum level of veterinary fecilities and care. The parameters which showed a deviation of 50% or more from E-R were distributed across all the observed features implying absence of uniformity in conditions for the elephants.



N*= 58

Figure 25: Distribution of Percentage wise deviation from E-R across all observed parameters

Discussion

The maintenance of non-domestic animals in captivity brings into question the welfare of the animals vis-à-vis their living conditions (biological and physical). The ecological and behavioural needs of elephants have to be met to maintain standards of welfare for the animals.

Parameters which showed deviations of 50% or more:

- The elephants were allowed to free range in forest conditions; however, they were all chained at night. Hence, standards of shelter type were less than the prescribed norms.
- The elephants were bathed only once, with no access to water while being tethered. Only when free ranging or when taken for a bath by their mahouts, they could access water sources.
- The practice of tethering the elephants with a one meter chain at night restricted movement and ability to select a suitable sleeping place/position.
- Walk duration was restricted to the time when allowed to free range, with the mahouts/ cawadis bringing the elephants back from the forest by 5p.m.

- Foraging duration was restricted to the time allotted to free ranging in the forest (9-9:30a.m. to 5p.m.); the elephants were stationary and stall fed for the remaining duration of the day.
- Provision for expression of reproductive behaviour was absent in the absence of female elephants in the camp

The practice of chaining the elephants to a place impinged on all aspects of the elephants' living conditions, reducing their ability to engage in species-typical behaviours. This condition was compounded by the presence of only male elephants in the camp. Male elephants are known to traverse greater areas in their search for females (Fernando, 2008). All the males were chained while they were in musth.

Handlers' status

Despite a history of elephant keeping in Kerala, none of the handlers in this camp had relatives in the same profession. This could imply new and inexperienced handlers opting for this profession. All the handlers were reported to consume alcohol. This practice may affect the way elephants are managed and may have an effect on the handlers' health in the long-term.

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Section 2b:
Captive Elephants in Aranyakavu Forest Camp

Executive summary

Aranyakavu timber depot under Forest Department in Kollam district maintains a single male elephant (62y, tusker) within its premises for timber related work.

The welfare of the elephant kept in the depot was assessed based on a rating scale. The rating scale ranging from unsuitable conditions to suitable conditions was used to assess the welfare status of captive elephants and their handlers.

The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter, defined as Experts' Rating (E-R). Mean Rating (M-R) representing the actual situation existing for the elephant/s was obtained through the ground survey. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.

The elephant had been captured from the wild when it was 10y old. M-R was 0.0 indicating a deviation of 100% from E-R. The elephant was maintained for timber hauling. M-R was 2.0 showing 75% deviation from E-R.

The elephant was maintained in an area with natural vegetation and earthen flooring. The animal was tied to a tree with a 1m chain. M-R was 6 implying a deviation of 26.6% from E-R.

Well water (within the shelter) and a stream (at a distance of 300m – 2kms) were used as sources for bathing/ drinking. Well water was used for drinking while the stream was a source for bathing. Bathing frequency was once/ day, duration was 1h; materials used were coir and coconut husk. M-R was 5 with a deviation of 37.4% from E-R.

The elephant was maintained singly with no opportunity for interaction. M-R was 0.0 showing 100% deviation from E-R. The elephant was chained by its foreleg with 1m chain. Chaining duration was 20 hrs when not working; 12h when working. M-R was 2 showing a deviation of 77% from E-R.

The elephant was described as docile and controllable and there were no incidents of killing or injury by the elephant. The animal did not exhibit stereotypic behavior. M-R was 8 showing no deviation from E-R. The elephant was used for timber hauling. Hours of work were 8a.m. to 11a.m. and 3p.m. to 5p.m. M-R for work type was 0.5 with a deviation of 93.8% from E-R.

The elephant was given only stall feed. Food provided was Leaves of *Caryota* sp., coconut (*Cocos nucifera*) and concentrate food consisting of a mixture of horse gram (*Macrotyloma uniflorum*), rice (*Oryza* sp.), wheat (*Triticum aestivum*), ragi (*Eleusine coracana*), salt and mineral mixture. M-R was 5 with a deviation 45.8% from E-R.

The male had not been reproductively active. It was not exposed to females/ been bred. Musth was reported for the elephant; was not aggressive during this period and normal chaining was practiced even during musth. M-R was 4 with a deviation of 47.9% from E-R.

Occurrence of intestinal worms, constipation, indigestion, minor wounds was observed. Dung samples were examined once in three months and blood/ urine samples annually. M-R was 6 showing a deviation of 26.3% from E-R.

The elephant had access to a veterinary doctor with 14 yrs of experience in treating elephants. The doctor visited the center occasionally. M- R was 5 with a deviation of 35% from E-R.

The elephant had two handlers; both were temporarily employed, with experience in this profession being 5 and 15 yrs. Annual salary drawn per handler was Rs.54,000/-. Both handlers consumed alcohol. M-R for salary drawn was 7 with a deviation of 22% from E-R. M-R for the practice of alcohol consumption was 0.0 with 100% deviation from E-R.

Overall M-R for elephants, considering all observed parameters, was 4.4 (SE= 0.5, N*= 47) indicating an overall deviation of 44% from E-R. Forty nine percent of the parameters showed a deviation of 50% or more from E-R, implying half of the observed features deviated to this extent, from the norms prescribed by experts.

Introduction
Kerala forest department maintains a number of timber depots where timber is sold; one such depot is at Aranyakavu in Kollam district. This depot maintains a single male elephant within its premises for timber related work.

Objective
Variation in captive conditions experienced by elephants may impose a series of altered living conditions. This report aims to:

- Assess the physical, social, psychological and reproductive aspects of elephants in captivity as an indicator of their welfare status.
- Assess the health status, veterinary practices, personnel and infrastructure available as they are directly/ indirectly associated with the elephant's welfare
- Handlers (mahouts/ cawadis) are an integral part of captive elephants wherein no restrictions are imposed on the contact between handler and elephant. The socio-economic status of handlers has also been assessed

Method
Elephants in captivity, especially those that are brought in the from the wild, undergo change in all aspects of living conditions with human influence being a predominant and all-encompassing factor. It is this deviation from wild conditions which has been used to assess the welfare status of captive elephants.

Captive features covering a spectrum of living conditions was separated into a number of parameters and information on the existing status for the elephant was collected through observation and interview of relevant personnel. The data was then rated using a scale developed by a team from different fields of expertise.

Rating method
The rating scale from zero (unsuitable conditions) to ten (suitable conditions) was used to assess the welfare status of captive elephants and their handlers. Experts (both wild and captive elephant specialists, wildlife veterinary experts, managers from protected areas, managers responsible for both wild and captive elephants and other wildlife, personnel from welfare organisations and elephant handlers) were invited to assess the welfare based on different parameters and their significance through an exclusive workshop conducted on the subject (Varma, 2008; Varma, et al., 2008; Varma and Prasad, 2008). Experts rated a total of 114 welfare parameters covering major aspects of captivity.

- The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter. For example mean expert rating of 8.0 (SE= 0.5, N=29) for a parameter 'floor' and 9.0 (SE=0.4, N=31) for 'source of water' was arrived at from the ratings suggested by each expert by averaging across all the experts' values.
- A mean rating for each parameter, across all the participating experts, has been used as the Experts' Rating (E-R) which represents the importance attached to a parameter i.e., for a parameter with 8.0 as the maximum value, only 2.0 (25%) deviation and

parameter with maximum value 9.0, only 1.0 or 10% from the prescribed norm is considered acceptable.

- For example, if an elephant is exposed only to natural flooring, the animal receives a rating of 8 and for entirely unnatural flooring the value is 0; if animal is exposed to both natural and unnatural flooring, the value is 4 (as 8+0/2= 8/2= 4). If an elephant is exposed to a natural water source, such as a river, it receives a value of 9; if the source of water is large lakes or reservoirs, it gets 4.5. A value of 3.5 is assigned for small water bodies like tanks and ponds. Tap water (running) gets 2.5 and if only buckets, pots, and tankers are in use, then the allocated value is 0.5. This rating is then averaged across all individuals in that institution to get a Mean Rating (M-R) for that feature. Thus M-R represents the actual situation existing for the elephant/s.
- Therefore, using the maxima given by experts as a base, a rating scale starting from zero to the particular maximum value for that parameter has been used and the data for each animal was collected, in a given regime (for example, forest camp or temple).
- In this investigation, variables which represent a common feature of the captive situation have been grouped to form a parameter. The variables have been termed sub-parameters. For example, the variables shelter type, shelter size, floor type in the shelter; all represent different aspects of the physical space provided to the elephant. Hence, they are grouped together to form the parameter "Shelter" and each constituent variable is a sub-parameter. In this investigation, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters. The Mean Rating (M-R) for a parameter is the mean of M-Rs across related sub-parameters and denotes welfare status of existing conditions on the ground for the particular parameter.
- The number of such related parameters (sub-parameters) varies for each regime.
- Results have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the parameters observed. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.
- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) have been used to indicate the professional/ socio-economic status, of value to the handler and his elephant.
- N* refers to number of sub-parameters observed. N refers to number of individuals.

Results

The timber depot maintained a single male captive elephant (62y, tusker).

Source

The change experienced by elephants when shifted from the wild to a captive situation is greater than one where the elephant is captive born.

- The elephant had been captured from the wild when it was 10y old

M-R was 0.0 indicating a deviation of 100% from E-R.

Purpose of keeping
Use of elephants specifically for work may over-ride consideration of the elephants' biological and ecological needs.

- The elephant was maintained for timber hauling

M-R was 2.0 showing 75% deviation from E-R.

Shelter
Elephants need sufficient physical space; this is based on knowledge derived from observation of wild elephants as home range may cover several hundred square kilometers (Sukumar, 2006). .

- The elephant was maintained in an area with natural vegetation and earthen flooring
- The animal was tied to a tree with a 1m chain
- Natural shade from trees was available

M-R was 5.9 (SE= 12.1, N*= 4) implying a deviation of 26.6% from E-R. Figures 1 and 2 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

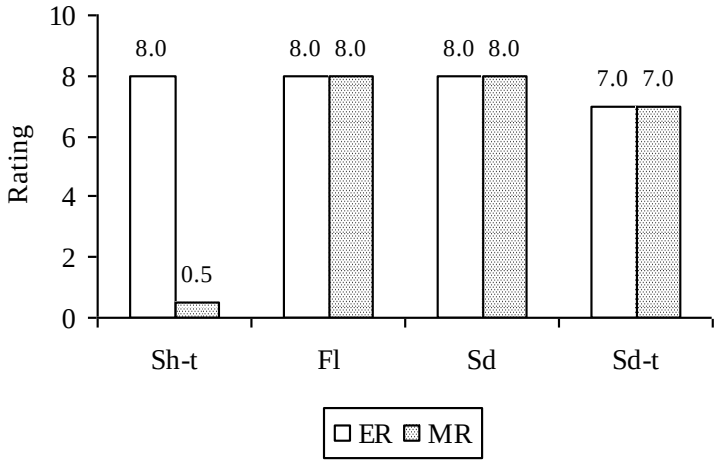


Figure 1: Comparison of E-R and M-R for 'shelter' sub-parameters

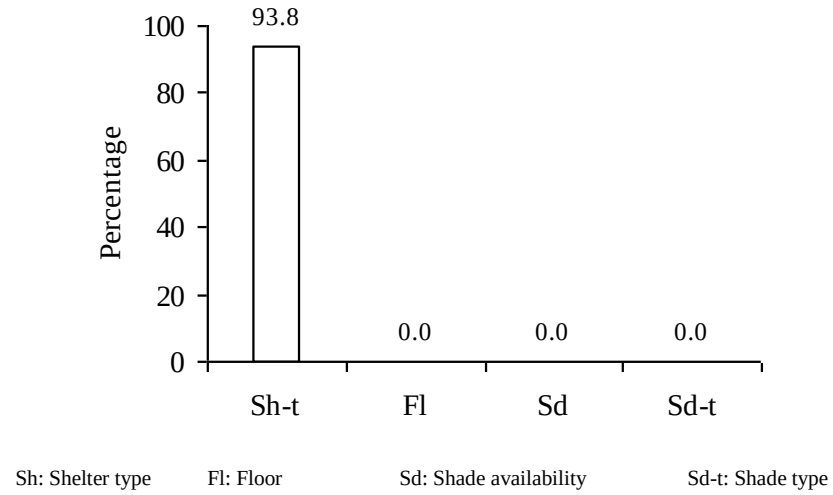


Figure 2: Percentage wise deviation from E-R for 'shelter' sub-parameters

Water and related parameters

Wild elephants have been observed to access water sources at least once a day, subject to its availability (Sukumar, 2006). Drinking, bathing, wallowing, socializing, are all part of the species specific behaviours observed at such sources. For males, it gives an opportunity to identify females in oestrus.

- Well water (within the shelter) and a stream (at a distance of 300m – 2kms) were used as sources for bathing/ drinking
- Well water was used for drinking while the stream was a source for bathing
- The elephant was allowed to drink water 3 times/day
- Bathing frequency was once/ day, duration was 1h; materials used were coir and coconut husk

M-R was 5.0 (SE= 0.9, N*= 6) with a deviation of 37.4% from E-R. Figures 3 and 4 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

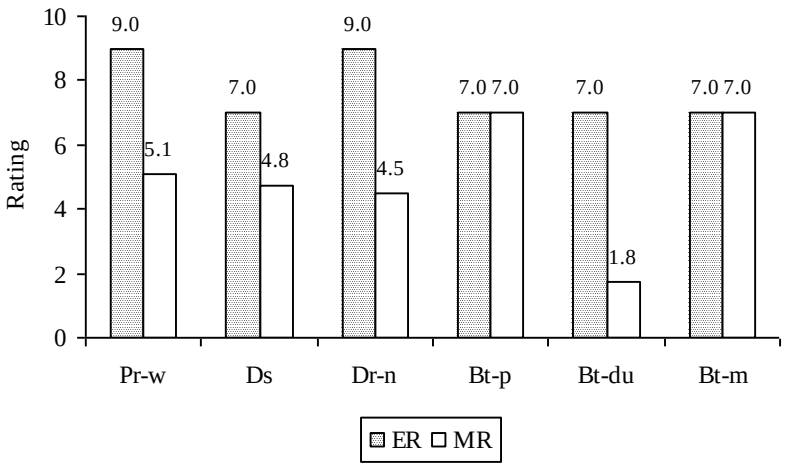
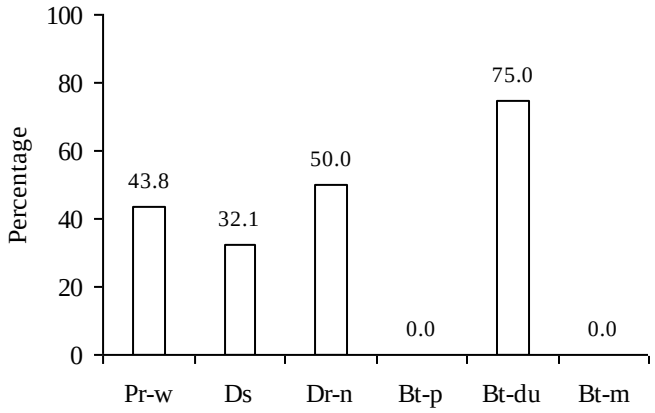


Figure 3: Comparison of E-R and M-R for 'water' sub-parameters



Pr-w: Availability of perennial source of running water Ds: Distance to water source
Dr-n: Number of times drinking water Bt-p: Bathing place Bt-du: Bath duration Bt-m: Bathing materials

Figure 4: Percentage wise deviation from E-R for 'water' sub-parameters

Sleep

Sufficient and suitable space for sleeping, allowing the elephants to make choice can help improve welfare status.

- The elephant was tied in its morning tethering place with a 1m chain

M-R for sleeping place was 4.0 with a deviation 50% from E-R.
M-R for sleep area (size) was 0.0 with a deviation of 100% from E-R.

Walk

Wild elephants, especially males, are known to cover vast distances as they search for mates (Fernando, et al., 2009), elephants are on constantly moving as they forage and engage in species-typical activities.

- The elephant was walked when bathed/ while feeding or when working

- Duration of walk was one hour

M-R for opportunity to walk was 9.0 with no deviation from E-R.
M-R for duration of walk was 1.0 with a deviation of 87.5% from E-R.

Social interaction
Males are known to stay with their natal herds and disperse as they reach sexual maturity (Sukumar, 2006); males need to interact with other individuals to know their strengths and weaknesses in order to survive and reproduce (Poole and Moss, 2008).

- The elephant was maintained singly with no opportunity for interaction

M-R was 0.0 showing 100% deviation from E-R.

Chaining
Elephants in captivity are generally chained for varying durations as a way of managing the animals.

- The elephant was chained by its foreleg with 1m chain
- Chaining duration was 20h when not working; 12h when working
- No opportunity to free range at night

M-R was 1.8 (SE= 1.2, N*= 4) showing a deviation of 77% from E-R. Figures 5 and 6 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

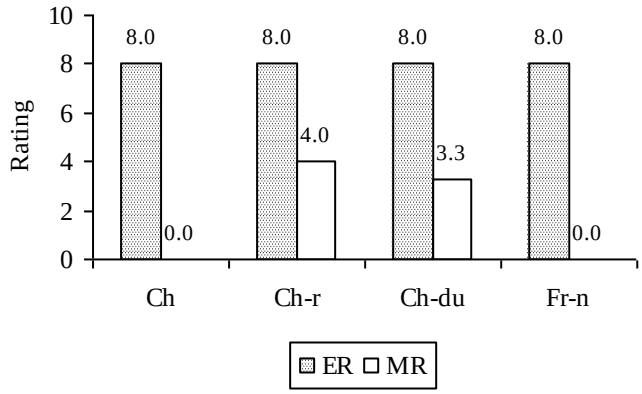
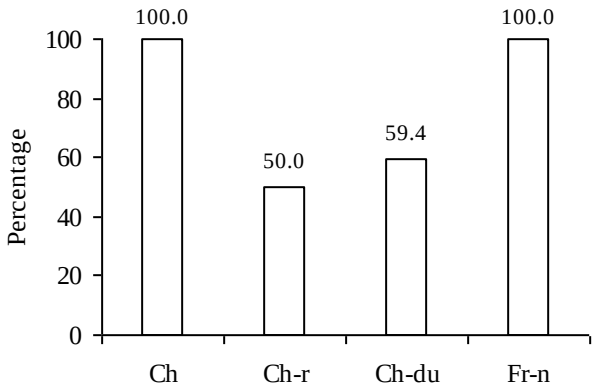


Figure 5: Comparison of E-R and M-R for ‘chaining’ sub-parameters



Ch: Chaining status Ch-t: Chain type Ch-r: Chaining region Ch-du: Chaining duration
Fr-du: Free-ranging duration Fr-n: Opportunity to free range at night

Figure 6: Percentage wise deviation from E-R for 'chaining' sub-parameters

Observed behaviour

While temperament and management are interlinked as cause and effect, a calm and quiet elephant can be handled easily. Occurrence of abnormal behaviours such as stereotypy is linked to poor welfare conditions.

- The elephant was described as docile and controllable
- There were no incidents of killing or injury by the elephant
- The animal did not exhibit stereotypic behavior

M-R was 8.0 (SE= 0.0,N*= 3) showing no deviation from E-R. Figures 7 and 8 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

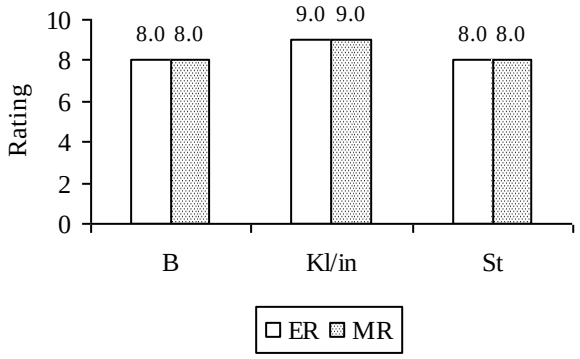
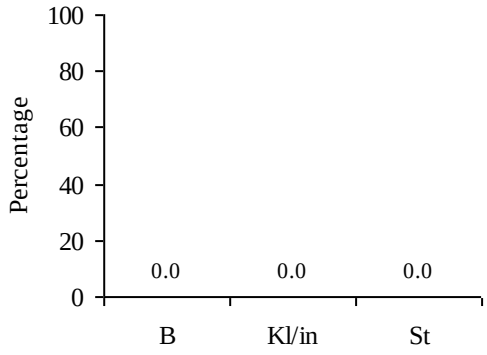


Figure 7: Comparison of E-R and M-R for 'behaviour' sub-parameters



B: Observed behaviour Kl/in: Incidents of killing/ injury by elephant St: Occurrence of stereotypy

Figure 8: Percentage wise deviation from E-R for 'behaviour' sub-parameters

Work

The nature of work is one of the deciding factors in determining an elephant's welfare captivity. Work that is similar to the species' natural behavioural repertoire will impose relatively less restrictions on the animals' ability to express species-typical behaviours.

- The elephant was used for timber hauling
- Hours of work were 8a.m. to 11a.m. and 3p.m. to 5p.m.

M-R for work type was 0.5 with a deviation of 93.8% from E-R.
M-R for work duration was 0.0 with a 100% deviation from E-R.

Food

The variety of plants eaten by wild elephants (McKay, 1973; Sukumar, 1991) cannot be replicated when captive elephants are given only stall feed. Opportunity to walk while foraging will also be absent.

- The elephant was given only stall feed
- Food provided was: Leaves of *Caryota* sp., coconut (*Cocos nucifera*) and concentrate food consisting of a mixture of horse gram (*Macrotyloma uniflorum*), rice (*Oryza* sp.), wheat (*Triticum aestivum*), ragi (*Eleusine coracana*), salt and mineral mixture
- Ration chart was maintained

M-R was 4.9 (SE= 2.2, N*= 4) with a deviation 45.8% from E-R. Figures 9 and 10 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

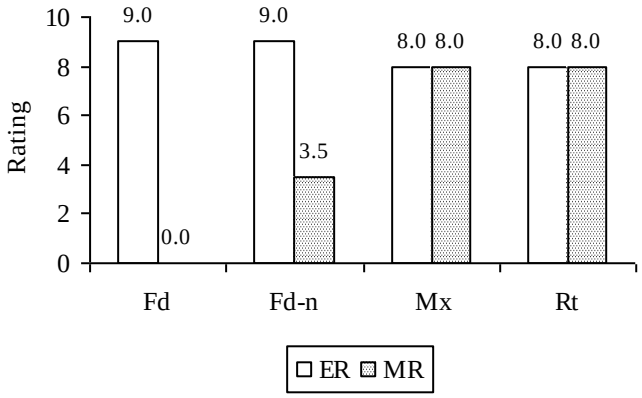
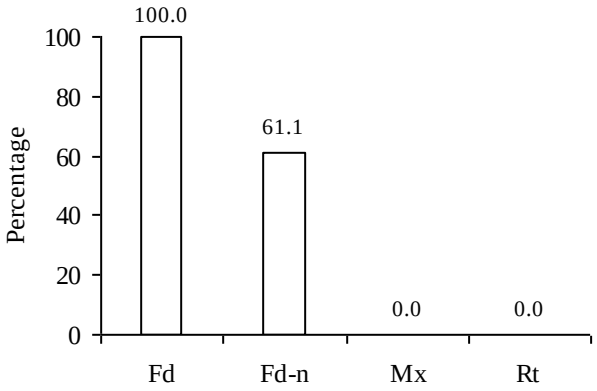


Figure 9: Comparison of E-R and M-R for 'food' sub-parameters



Fd: Food provisioning type Fd-n: Number of stall fed items Mx: Provision of mineral mixture
Rt: Usage of ration chart

Figure 10: Percentage wise deviation from E-R for 'food' sub-parameters

Reproductive status

Males attain sexual maturity by 10y of age and reaches dominance in male hierarchy when in musth (Sukumar, 2006). Males tend to wander more when in musth, in search of mates.

- The male had not been reproductively active
- It was not exposed to females/ been bred
- Musth was reported for the elephant; was not aggressive during this period and normal chaining was practiced even during musth

M-R 4.2 (SE= 2.0, N*= 6) with a deviation of 47.9% from E-R. Figures 11 and 12 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

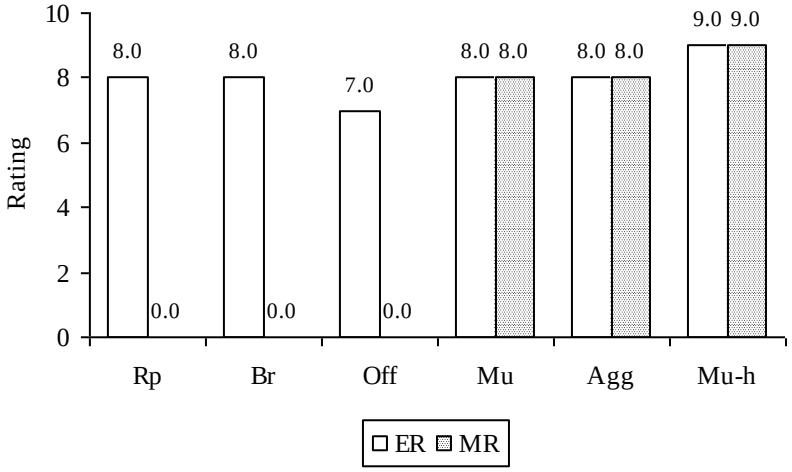


Figure 11: Comparison of E-R and M-R for 'male reproductive status'

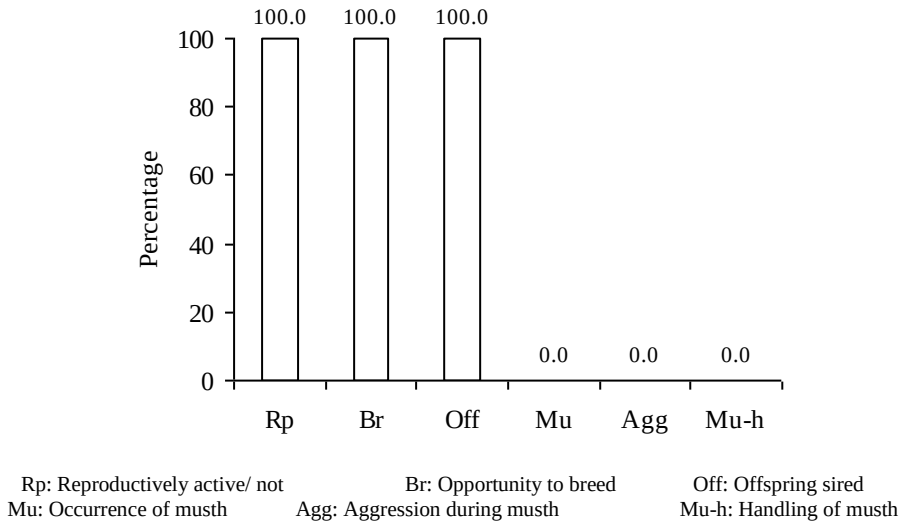


Figure 12: Percentage wise deviation from E-R for 'male reproductive status'

Health status and veterinary protocol

Subjecting elephants to captive conditions imposes a number of altered living conditions for the animals with consequences on their physical health.

- Occurrence of intestinal worms, constipation, indigestion, minor wounds was observed
- Deworming was done
- Oil was applied on the body
- The elephant was not immunized
- Dung samples were examined once in three months and blood/ urine samples annually

M-R was 5.9 (SE= 1.3, N*= 6) showing a deviation of 26.3% from E-R. Figures 13 and 14 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

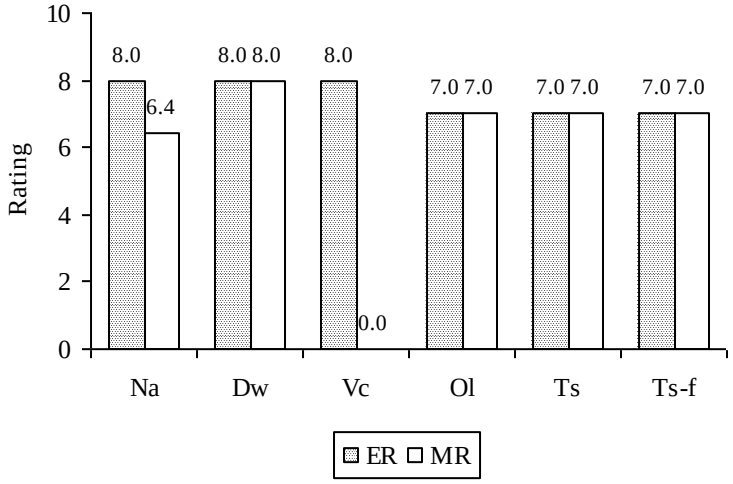
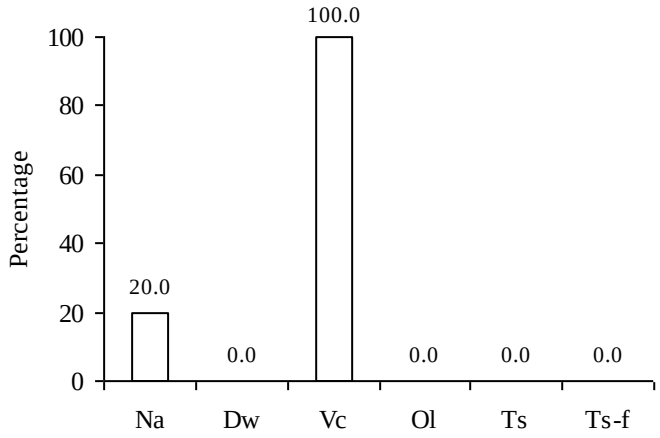


Figure 13: Comparison of E-R and M-R for 'health status' sub-parameters



Na: Nature of disease/ injury Dw: Deworming status Vc: Vaccination status Ol: Oiling status
Ts: Sample tests of dung/ urine/ blood Ts-f: Frequency of sample testing

Figure 14: Percentage wise deviation from E-R for 'health status' sub-parameters

Veterinary personnel and facilities

Availability of veterinary personnel and infrastructure is an important feature of a captive situation.

- The elephant had access to a veterinary doctor with 14y experience in treating elephants
- The doctor visited the center occasionally
- Accommodation for staff, cooking shed, food preparation hall, provision shed and camp site were available; veterinary care unit was not available

M- R was 5.2 (SE= 1.5, N*= 5) with a deviation of 35% from E-R. Figures 15 and 16 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

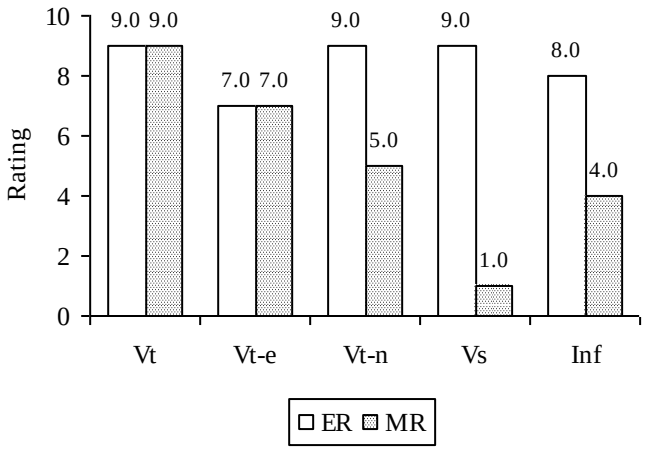
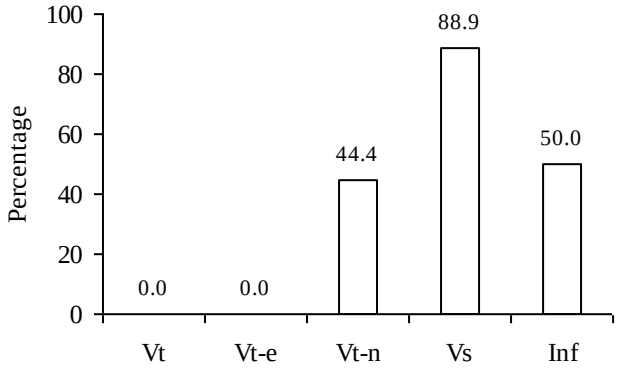


Figure 15: Comparison of E-R and M-R for 'veterinary personnel' sub-parameters



Vt: Availability of veterinary doctor Ex-e: Experience with elephants Vt-n: Number of years of experience
Vs: Frequency of visits Inf: Infrastructure (facilities available)

Figure 16: Percentage wise deviation from E-R for 'veterinary personnel' sub-parameters

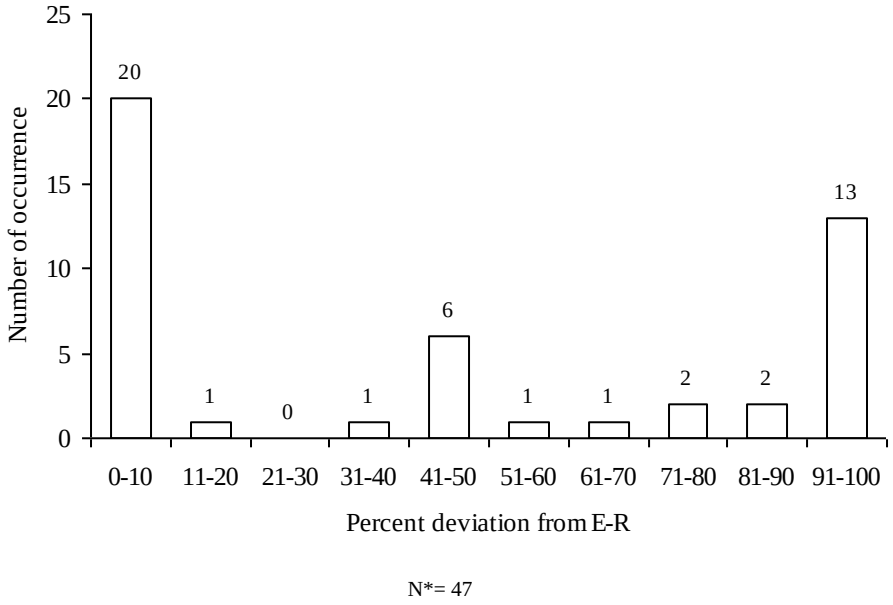
Handler's socio-economic status

- The elephant had two handlers; both were temporarily employed with experience in this profession being 5 and 15y.

- Annual salary drawn was Rs.54,000/-
- Both handlers consumed alcohol

M-R for salary drawn was 7.0 (N=2) with a deviation of 22% from E-R.
M-R for the practice of alcohol consumption was 0.0 (N= 2) with 100% deviation from E-R.

Overall Welfare Status
Overall M-R, considering all observed parameters, was 4.4 (SE= 0.5, N*= 47) indicating an overall deviation of 44% from E-R. Figure 17 gives the distribution of deviation from E-R across the observed parameters. 49% of the parameters showed a deviation of 50% or more from E-R, implying half of the observed features deviated to this extent, from the norms prescribed by experts.



N*= 47

Figure 17: Distribution of Percentage wise deviation from E-R across all observed parameters for elephants

Discussion
Knowledge on the biological and ecological needs of elephants has been collected through a number of studies. This knowledge has been used as a benchmark against which the captive conditions of elephants are viewed. This comparison is relevant and significant considering the non-domestic nature of elephants and their wild-caught status. The greater the deviation from the wild, the poorer the welfare status of the elephant.

Features which were not suitable for the elephant:

- The physical features such as natural vegetation, vast space, earthen flooring and availability of running water were all positive aspects of this place. This was, however, offset by the practice of chaining the elephant to a tree for 12-20h, making most of these features inaccessible to the elephant.
- Since it was caught in the wild, the change undergone by it when subjected to captivity would be immense. This change was not reduced; the opposite was achieved

by maintaining it in isolation without access to females and no opportunity to free range to forage in the adjacent forests. In addition, walking was restricted either due to work schedule or due to being chained. When not working or being bathed, the elephant had no psychological stimulation other than feeding.

- The absence of aggression towards handlers and stereotypy were both positive features; this, however, does not reduce the relatively poor welfare status of the elephant in terms of the deviation experienced by it from those observed in the wild.

Handlers' status:
The scant information available indicates prevalence of alcohol consumption among the handlers.

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Section 2c:
Captive Elephants in Kottur Elephant Care Center

Executive summary

The Elephant rehabilitation center at Kappukadu, Kottur in Kerala was begun in 2008 as a rehabilitation/ care center for aged elephants as well as to provide training for rescued calves in a semi-natural environment.

The welfare status of elephants in Kottur was assessed based on a rating scale. The rating scale from unsuitable conditions to suitable conditions was used to assess the welfare status of captive elephants and their handlers. The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter, defined as Experts' Rating (E-R). Mean Rating (M-R) representing the actual situation existing for the elephant/s was obtained through the ground survey. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.

The care center maintained four elephants: an adult female aged 37 yrs, two females aged 6.5 and 7 yrs, and a single male aged 66 yrs. Both adult elephants, male and female, had been captured from the wild. Both calves had been rescued from the wild. M-R for source of elephants was 2 indicating a deviation of 75% from E-R.

This place was maintained as a care center to provide for the elephants' needs. M-R was 8.0 (N= 5) showing no deviation from E-R.

All the elephants were maintained in enclosures measuring 1acre to 1 ha, with roofed tethering place within each enclosure. The enclosures were surrounded by Elephant Protection Trenches. Both calves were in one enclosure, the adults were each in a separate enclosure. Earthen flooring with natural shade was available. M-R was 7 implying a deviation of 14.8% from E-R.

Lake (250m from shelter) and well water (within the shelter) were used as water sources. The lake was used for bathing/ drinking while the well-water was a source for drinking water. Bathing frequency was twice/ day, duration was 2 hrs; materials used were coir and coconut husk. M-R was 5 with a deviation of 38% from E-R.

All elephants were allowed opportunity for interaction. The adults had opportunity to interact while bathing/ feeding; otherwise, the adults were kept in separate enclosures. Both calves were together 24 hrs. M-R was 6 showing a deviation of 22% from E-R.

All elephants were chained by a 1m chain tied to one leg. The elephants were chained from 6 p.m. to 8a.m. Free-ranging opportunity was provided for 1-2 hrs duration within the enclosure; Weather permitting, free ranging was allowed in the nearby forest for 2hrs. No opportunity to free range at night. M-R was 2 showing a deviation of 76% from E-R.

All elephants were described as docile. The adult male was described as timid; it was aggressive and an incident of killing (details not known) had been reported ten years ago, however, no such incident had occurred since. None of the elephants showed stereotypic behavior. M-R for observed temperament was 8 with no deviation from E-R.

The adult female elephant was used for tourism, occasionally. None of the other elephants were used for work. M-R for work type was 7 showing a deviation of 12.5% from E-R.

All elephants were given mainly stall feed with restricted grazing or browsing opportunity in the forest. Types of food provided were *Caryota* sp., coconut *Cocos nucifera*), grass and concentrate food consisting of a mixture of horse gram (*Macrotyloma uniflorum*), rice (*Oryza* sp.) or wheat (*Triticum aestivum*), ragi (*Eleusine coracana*), salt and mineral mixture. M-R was 7.0 with a deviation of 22% from E-R.

The single adult female (37 yrs) was reported be in regular oestrus, had been exposed to males and had calved once. The male had exhibited musth signs and had been confined to a separate enclsoure during its musth. M-R for female reproductive status was 7 with a deviation of 18.8% from E-R. M-R for occurrence of musth in males was 8 with no deviation from E-R.

Occurrence of intestinal worms, constipation, indigestion, minor wounds was observed among the elephants. Dung samples were examined once in three months and blood/ urine samples annually. M-R was 6 showing a deviation of 27.5% from E-R.

The elephants had access to a veterinary doctor with 14y experience in treating elephants. The doctor visited the center 1-2 times/month; elephant squad was available. M- R was 6 with a deviation of 29% from E-R.

Eight handlers were employed for four elephants, all had more than 15y experience in this profession. All were employed temporarily, annual salary drawn per handler was Rs.54,000/- and all were covered by insurance, paid by the forest department. . The handlers used stick/ ankush to control their elephants. Except one, none of the handlers consumed alcohol. M-R was 5 with a deviation of 38.5% from E-R.

Overall M-R for elephants, across all observed parameters, was 5.3 indicating a deviation of 34% from E-R. Forty percent of the observed parameters showed a deviation of 50% or more from E-R implying nearly half of the observed features deviated by at least 50% from norms prescribed by experts.

Introduction
The Elephant rehabilitation center at Kappukadu, Kottur in Kerala was begun in 2008 as a rehabilitation center/ care center for aged elephants as well as to provide training for rescued calves in a semi-natural environment. The state forest department controls the management of the center.

Objective
Keeping elephants in captivity, specially for a care center, involves providing for the needs of the elephants. This report aims to:

- Assess the welfare status of captive elephants by considering the availability of provisions catering to the ecological and biological needs of the animals
- Assess the handlers' socio-economic status as they form an integral part of captive elephant management

Method
Elephants have not been domesticated even if they have been kept under human control. The species-typical activities of elephants, whether aged/ young, are based on biological and ecological needs as shown by their wild counterparts. The physical/ social/ psychological and reproductive needs of elephants have to be met if better welfare conditions are to be provided in captivity. The welfare status of captive elephants has been assessed by considering the deviations existing in captivity from those observed for wild elephants. The existing situation for elephants has been rated using a scale developed by experts from different fields.

Rating method
The rating scale from zero (unsuitable conditions) to ten (suitable conditions) was used to assess the welfare status of captive elephants and their handlers. Experts (both wild and captive elephant specialists, wildlife veterinary experts, managers from protected areas, managers responsible for both wild and captive elephants and other wildlife, personnel from welfare organisations and elephant handlers) were invited to assess the welfare based on different parameters and their significance through an exclusive workshop conducted on the subject (Varma, 2008; Varma, et al., 2008; Varma and Prasad, 2008). Experts rated a total of 114 welfare parameters covering major aspects of captivity.

- The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter. For example mean expert rating of 8.0 (SE= 0.5, N=29) for a parameter 'floor' and 9.0 (SE=0.4, N=31) for 'source of water' was arrived at from the ratings suggested by each expert by averaging across all the experts' values.
- A mean rating for each parameter, across all the participating experts, has been used as the Experts' Rating (E-R) which represents the importance attached to a parameter i.e., for a parameter with 8.0 as the maximum value, only 2.0 (25%) deviation and parameter with maximum value 9.0, only 1.0 or 10% from the prescribed norm is considered acceptable.
- For example, if an elephant is exposed only to natural flooring, the animal receives a rating of 8 and for entirely unnatural flooring the value is 0; if animal is exposed to

both natural and unnatural flooring, the value is 4 (as 8+0/2= 8/2= 4). If an elephant is exposed to a natural water source, such as a river, it receives a value of 9; if the source of water is large lakes or reservoirs, it gets 4.5. A value of 3.5 is assigned for small water bodies like tanks and ponds. Tap water (running) gets 2.5 and if only buckets, pots, and tankers are in use, then the allocated value is 0.5. This rating is then averaged across all individuals in that institution to get a Mean Rating (M-R) for that feature. Thus M-R represents the actual situation existing for the elephant/s.

- Therefore, using the maxima given by experts as a base, a rating scale starting from zero to the particular maximum value for that parameter has been used and the data for each animal was collected, in a given regime (for example, forest camp or temple).
- In this investigation, variables which represent a common feature of the captive situations have been grouped to form a parameter. The variables have been termed sub-parameters. For example, the variables shelter type, shelter size, floor type in the shelter; all represent different aspects of the physical space provided to the elephant. Hence, they are grouped together to form the parameter "Shelter" and each constituent variable is a sub-parameter. In this investigation, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters. The Mean Rating (M-R) for a parameter is the mean of M-Rs across related sub-parameters and denotes welfare status of existing conditions on the ground for the particular parameter.
- The number of such related parameters (sub-parameters) varies for each regime.
- Results have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the parameters observed. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.
- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) have been used to indicate the professional/ socio-economic status, of value to the handler and his elephant.
- N* refers to number of sub-parameters observed. N refers to number of individuals.

Results

The care center maintained four elephants: an adult female aged 37y, two females aged 6.5 and 7y, and a single male aged 66 yrs.

Source

When elephants are captured from the wild, they undergo much greater change in living conditions than when born in captivity. This is true for calves which have been rescued from the wild.

- Both adult elephants, male and female, had been captured from the wild
- Both calves had been rescued from the wild

M-R was 1.5 (SE= 1.0, N= 3) indicating a deviation of 75% from E-R.

Purpose of keeping

In captivity, the concept of maintaining elephants to provide rehabilitation is considered to better than one where the elephants are maintained purely for commercial purposes. The rating has been designed to include the physical environment available for the elephants.

- This place was maintained as a care center to provide for the elephants' needs

M-R was 8.0 (N= 5) showing no deviation from E-R.

Shelter

In the wild, elephants wander across varied vegetation as they engage in species-typical activities. Home range size is reported to vary from 250-1000km^2, a smaller area of 50-150 km^2 in Sri Lanka (Sukumar, 2006) implying the need for physical space .

- All the elephants were maintained in enclosures measuring 1acre to 1ha, with roofed tethering place within each enclosure
- The enclosures were surrounded by Elephant Protection Trenches
- Both calves were in one enclosure, the adults were each in a separate enclosure
- Earthen flooring with natural shade was available

M-R was 6.8 (SE= 1.0, N*= 4) implying a deviation of 14.8% from E-R. Figures 1 and 2 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

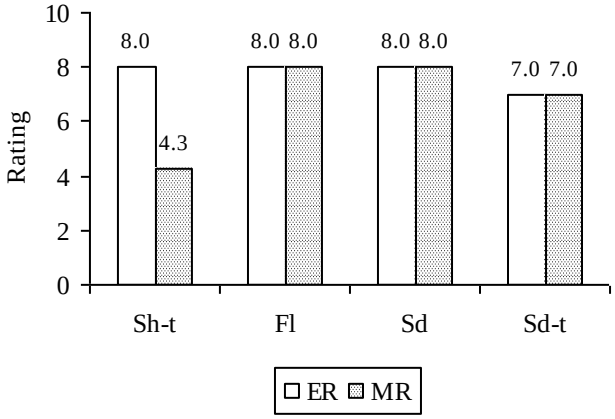


Figure 1: Comparison of E-R and M-R for 'shelter' sub-parameters

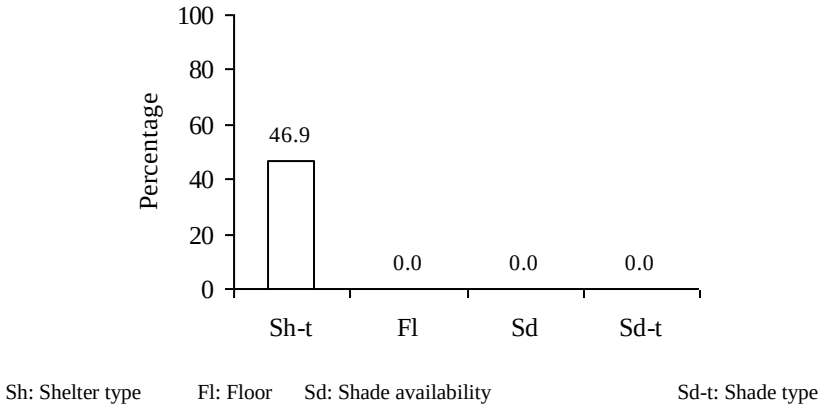


Figure 2: Percentage wise deviation from E-R for 'shelter' sub-parameters

Water and related parameters

Access to water when needed by elephants has been considered. Such sources should allow for expression of species-specific behaviour.

- Lake (250m from the shelter) and well water (within the shelter) were used as sources
- The lake was used for bathing/ drinking while the well-water was a source for drinking water
- The elephants were allowed to drink water 3-4 times/day
- Bathing frequency was twice/ day, duration was 2h; materials used were coir and coconut husk

M-R was 5.0 (SE= 0.7, N*= 7) with a deviation of 38% from E-R. Figure 3 and 4 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

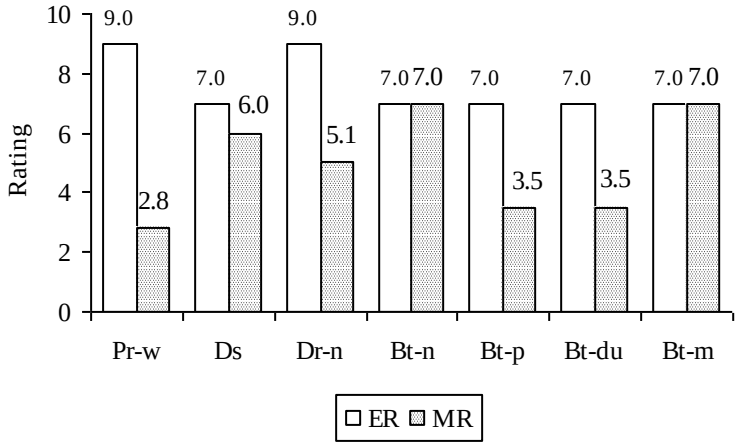


Figure 3: Comparison of E-R and M-R for 'water' sub-parameters

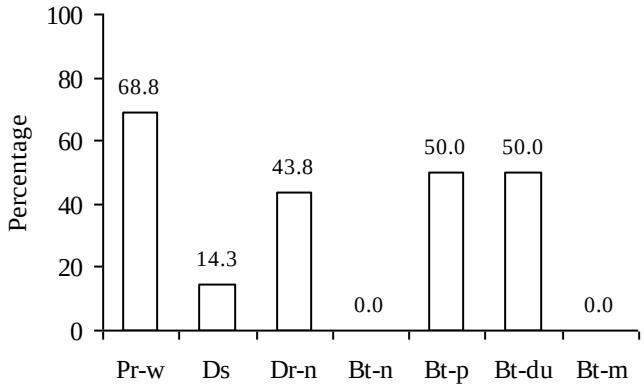


Figure 4: Percentage wise deviation from E-R for 'water' sub-parameters

Sleep
Unsuitable sleeping surfaces may lead to health problems or injuries for the elephants

- The elephants were tied in their tethering places with a 1m chain for the night

M-R for sleeping place was 4.0 (SE= 0.0, N= 4) with a deviation of 50% from E-R.
M-R for sleep area (size) was 0.0 (SE= 0.0, N=4) with a deviation of 100% from E-R.

Walk
Elephants are constantly on the move, being active for most parts of the day, spending 15% of their time in walking alone; Poole and Granli (2009).

- All elephants were given opportunity to walk
- The elephants were walked when taken for bathing between 8a.m. to 10a.m.; depending on weather, they were let loose in the nearby forest to be brought back two hours later; let loose in their enclosures for 1-2h everyday

M-R was 4.3 (SE= 2.9, N*= 3) with a deviation of 46% from E-R. Figure 5 and 6 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

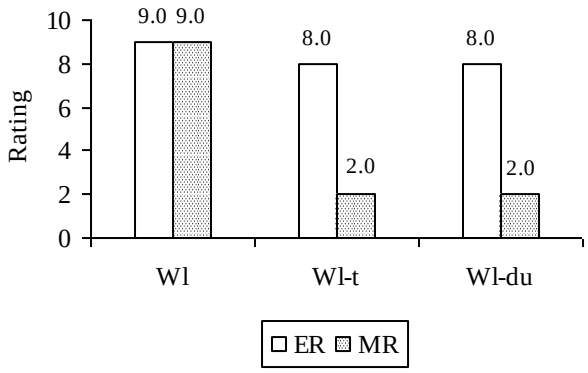
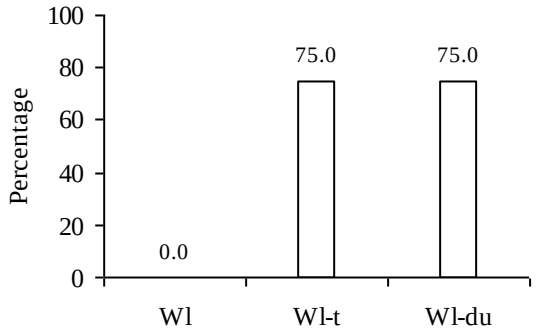


Figure 5: Comparison of E-R and M-R for 'walk' sub-parameters



Wl: Opportunity to walk Wl-t: Time of walk Wl-du: Duration of walk

Figure 6: Percentage wise deviation from E-R for 'walk' sub-parameters

Social interaction

Formation and maintenance of social groups is integral to elephant biology. Opportunity to express species typical behaviours in a social context has been considered.

- All elephants were allowed opportunity for interaction
- The adults had opportunity to interact while bathing/ feeding; otherwise, the adults were kept in separate enclosures
- Both calves were together 24h

M-R was 6.2 (SE= 1.5, N*= 3) showing a deviation of 22% from E-R. Figures 7 and 8 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

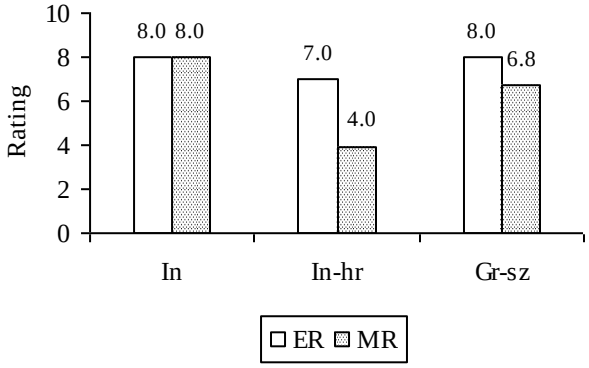
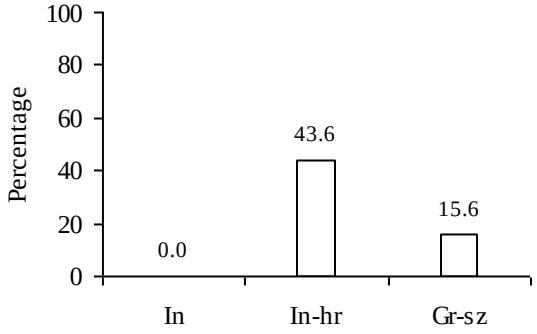


Figure 7: Comparison of E-R and M-R for 'interaction' sub-parameters



In: Opportunity for interaction In-hr: Hours of interaction Gr-sz: Group size

Figure 8: Percentage wise deviation from E-R for 'interaction' sub-parameters

Chaining

Use of chains restricts the animal not only physically, but also psychologically as they are not allowed to perform their natural behaviours.

- All elephants were chained with a 1m chain tied to one leg
- The elephants were chained from 6p.m. to 8a.m.
- Free-ranging opportunity was provided for 1-2h duration within the enclosure; Weather permitting free ranging was allowed in the nearby forest for 2h
- No opportunity to free range at night

M-R was 1.9 (SE= 0.7, N*= 6) showing a deviation of 76% from E-R. Figures 9 and 10 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

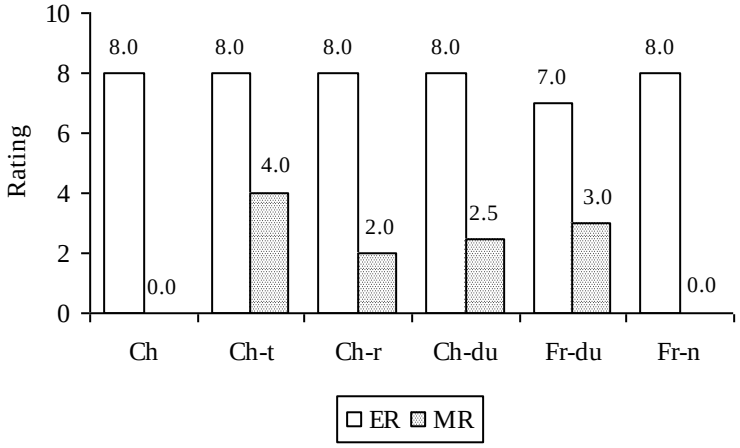
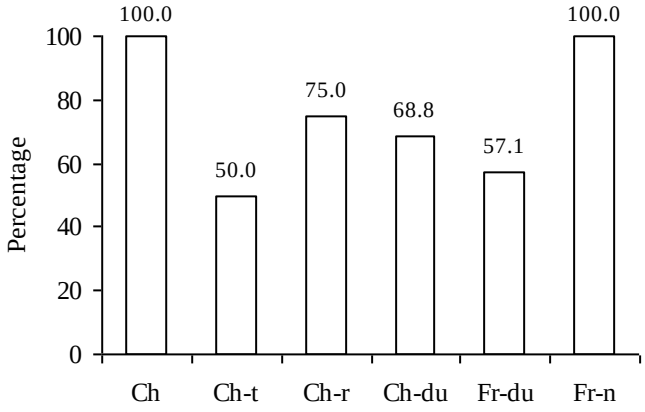


Figure 9: Comparison of E-R and M-R for 'chaining' sub-parameters



Ch: Chaining status Ch-t: Chain type Ch-r: Chaining region Ch-du: Chaining duration
Fr-du: Free-ranging duration Fr-n: Opportunity to free range at night

Figure 10: Percentage wise deviation from E-R for 'chaining' sub-parameters

Observed behaviour

Elephant temperament and management policies are interlinked: a calm animal may not be isolated as opposed to an aggressive one. The occurrence of stereotypy is an indication of past/ present poor living conditions.

- All elephants were described as docile
- The adult male was described as timid, it was aggressive and had killed (details not known) ten years ago, no incidents reported since
- None of the elephants showed stereotypic behaviour

M-R for observed temperament was 8.0 (SE= 20.0, N= 4) with no deviation from E-R.
M-R for occurrence of stereotypy was 8.0 (SE= 0.0, N= 4) with no deviation from E-R.

Work
The work performed by elephants along with its physical environment is a predominant factor in determining their living conditions.

- The adult female elephant was used for tourism, occasionally
- None of the other elephants were used for work

M-R for work type was 7.0 (SE= 1.2, N= 4) showing a deviation of 12.5% from E-R.

Food
The practice of providing only stall feed, in captivity, will not replicate the variety of plants eaten by elephants in the wild.

- All elephants were given stall feed with restricted opportunity for grazing/browsing in the forest
- Food provided was: *Caryota* sp., coconut *Cocos nucifera*), grass and concentrate food consisting of a mixture of horse gram (*Macrotyloma uniflorum*), rice (*Oryza* sp.), ragi (*Eleusine coracana*), salt and mineral mixture

M-R was 4.0 (SE= 2.8, N*= 3) with a deviation 55.5% from E-R. Figures 11 and 12 give the comparative rating and Percentage wise deviation respectively, for each of the sub-Parameters.

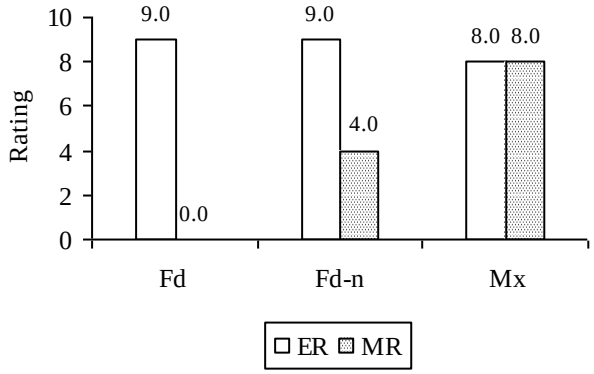
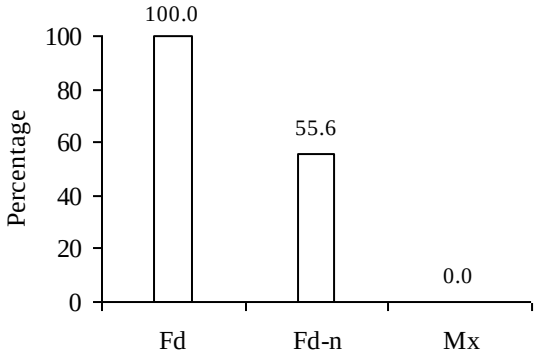


Figure 11: Comparison of E-R and M-R for ‘food’ sub-parameters



Fd: Food provisioning type Fd-n: Number of stall fed items Mx: Provision of mineral mixture

Figure 12: Percentage wise deviation from E-R for 'food' sub-parameters

Reproductive status

Normal reproductive functioning among captive elephants maybe hindered by a number of factors: lack of individuals of opposite sex, poor health status, stress induced reproductive abnormality, preventive measures initiated by the management.

- The single adult female (37y) was reported be in regular oestrus, had been exposed to males, no records were available on male source for mating and had calved once
- The male had exhibited musth signs the previous year; was kept in a separate enclsoure during its musth

M-R for female reproductive status was 6.5 (SE= 1.4, N*= 4) with a deviation of 18.8% from E-R. Figure 13 and 14 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters. M-R for occurrence of musth in males was 8.0 (N= 1) with no deviation from E-R. M-R for handling of musth was 4.5 (N= 1) showing a deviation of 50% from E-R.

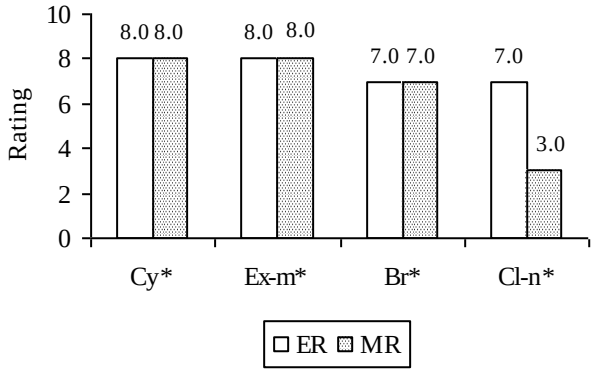


Figure 13: Comparison of E-R and M-R for 'female reproductive status'

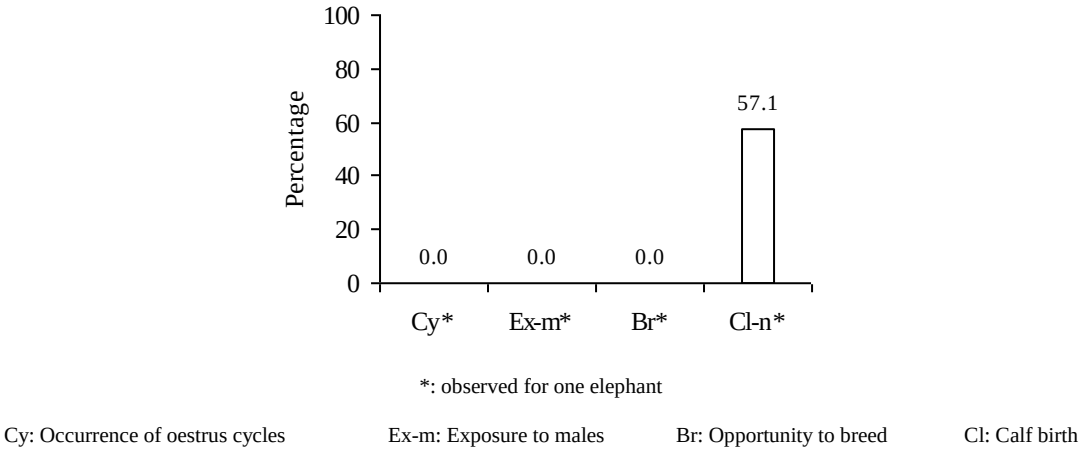


Figure 14: Percentage wise deviation from E-R for 'female reproductive status'

Health status and veterinary protocol

Conditions prevailing in captivity will differ from those experienced in the wild predisposing the elephants to a number of diseases/ disorders. In addition, regular adherence to the prescribed veterinary schedules constitutes an important part of the health regimen of captive elephants.

- Occurrence of intestinal worms, constipation, indigestion, minor wounds was observed among the elephants
- Deworming was done
- Medicated oil was applied on the body
- None of the elephants were immunized
- Dung samples were examined once in three months and blood/ urine samples annually

M-R was 5.8 (SE= 1.3, N*= 6) showing a deviation of 27.5% from E-R. Figures 15 and 16 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

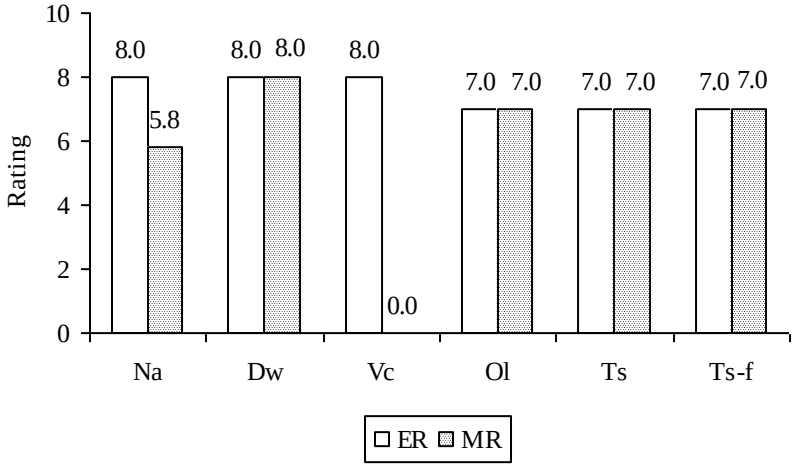
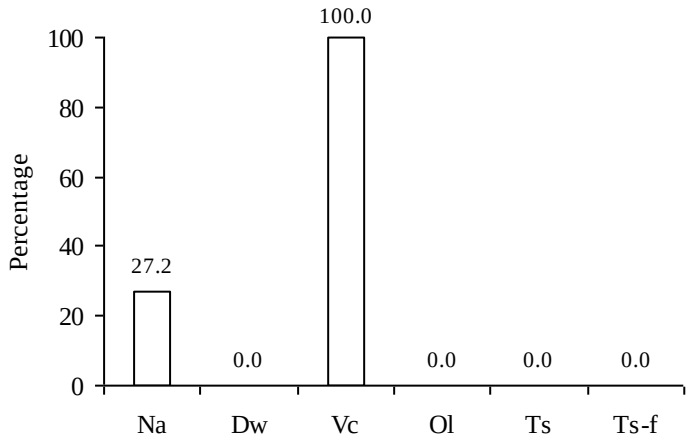


Figure 15: Comparison of E-R and M-R for 'health status' sub-parameters



Na: Nature of disease/ injury Dw: Deworming status Vc: Vaccination status Ol: Oiling status
Ts: Sample tests of dung/ urine/ blood Ts-f: Frequency of sample testing

Figure 16: Percentage wise deviation from E-R for 'health status' sub-parameters

Veterinary personnel and facilities

Access to veterinary doctors with relevant experience and availability of infrastructure is considered necessary in maintaining proper welfare of captive elephants.

- The elephants had access to a veterinary doctor with 14y experience in treating elephants
- The doctor visited the center 1-2 times/month; elephant squad was available
- Accommodation for staff, veterinary care unit, cooking shed, food preparation hall, provision shed and camp site were available

M- R was 5.7 (SE= 1.1, N*= 5) with a deviation of 29% from E-R. Figures 17 and 18 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

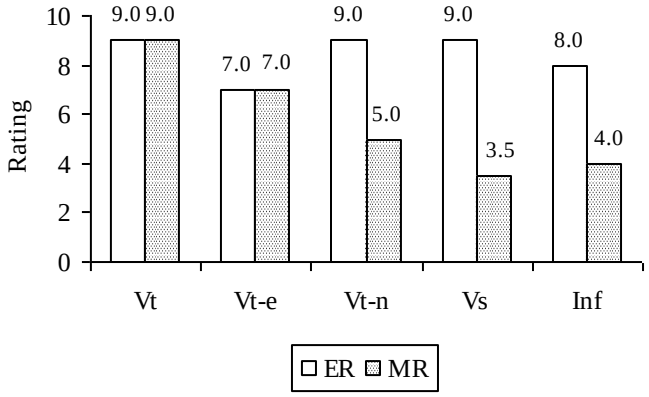
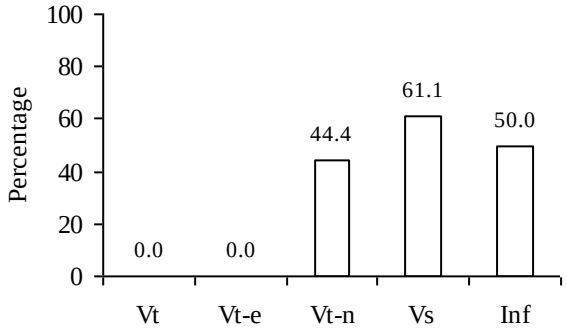


Figure 17: Comparison of E-R and M-R for 'veterinary personnel' sub-parameters



Vt: Availability of veterinary doctor Ex-e: Experience with elephants Vt-n: Number of years of experience
Vs: Frequency of visits Inf: Infrastructure (facilities available)

Figure 18: Percentage wise deviation from E-R for 'veterinary personnel' sub-parameters

Handler's socio-economic status

Having relatives in this profession/ coming from a traditional background of handling elephants is an added advantage for efficient performance. The economic status of handlers is very important not only for the handlers themselves, but also for the way the elephants are managed by them.

- Eight handlers were employed for four elephants, all had more than 15y experience in this profession
- All were employed temporarily
- Except one, none of the handlers had relatives working in this profession
- None of the handlers came from a background associated with this profession
- Annual salary drawn was Rs.54,000/-
- The handlers used stick/ ankush to control their elephants
- All were covered by insurance, paid by the forest department
- Except one, none of the handlers consumed alcohol

M-R was 4.9 (SE= 1.5, N*= 6) with a deviation of 38.5% from E-R. Figures 20 and 21 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

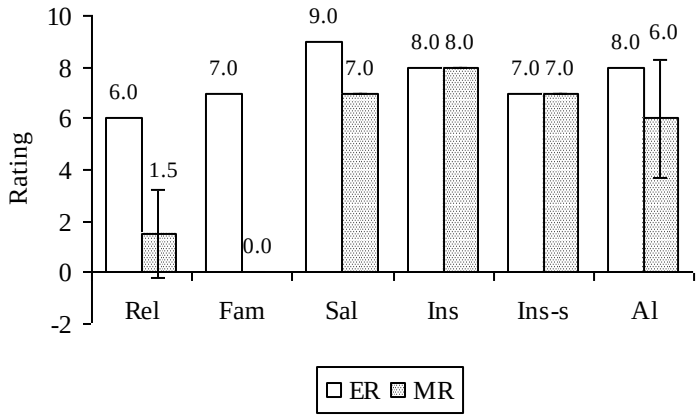
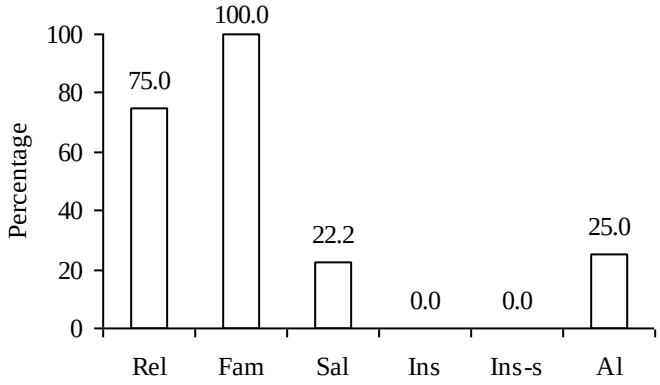


Figure 20: Comparison of E-R and M-R for 'handlers' socio-economic status' sub-parameters

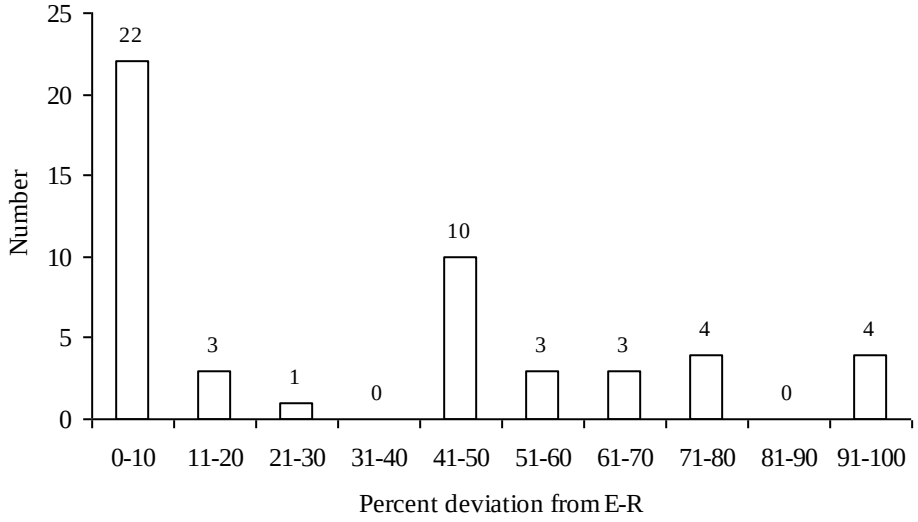


Rel: Relatives in this profession Fam: Family occupation Sal: Salary drawn In: availability of insurance
Ins-s: Source of insurance Al: Consumption of alcohol

Figure 21: Percentage wise deviation from E-R for 'handlers' socio-economic status' sub-parameters

Overall Welfare Status

Overall M-R was 5.3 (SE= 0.4, N*= 50) indicating a deviation of 34% from E-R. Figure 19 shows the distribution of Percentage wise deviation from E-R across all observed parameters. Forty two percent of the observed parameters showed a deviation of 50% or more from E-R implying nearly half of the observed features deviated by at least 50% from norms prescribed by experts. These parameters were distributed across all major features: shelter, food, water, social interaction and reproductive status.



N*= 50

Figure 19: Distribution of Percentage wise deviation from E-R for observed parameters

Discussion

The complex social life of elephants, their dependence on learning in a social context, their ability to traverse vast distances, generalist feeding habits, their immense size, all add to the complex requirement of the species in captivity. Added to this fact, is their non-domestic nature, of not being genetically altered through selective breeding and introduction of new individuals from the wild. Thus, deviations from the wild, observed in a captive context, have been used as an indicator of welfare status for the animals.

One feature that affected all other captive conditions was the practice of chaining the elephants. Due to this practice, despite the availability of a physical environment with varied vegetation, the elephants could not access it. This had the effect of obstructing species-typical activities. The elephants had an acre/ hectare of area to wander on, which could not be accessed as they were not allowed to free range. Similarly, a lake was available as a water source, but the elephants were tethered to a place for at least 14h/ day.

The presence of elephants of different ages and sex was not matched by efforts at providing opportunity to socialize in an unrestricted way. The adult female was said to be aversive towards the calves while the adult male was aggressive. Records pertaining to the adult elephants' reproductive status were not available.

Mahout status

Except one, none of the handlers came from a background of working with elephants, despite Kerala's history of elephant keeping. This could imply new entrants into this field with employment dissatisfaction a possible factor. This needs further study.

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Section 2d:
Captive Elephants in Konni Forest Camp

Executive summary

Konni camp harbors elephants to assist in hauling timber and other related operations. The welfare of elephants kept under this camp was assessed based on a rating scale.

The rating scale from unsuitable conditions to suitable conditions was used to assess the welfare status of captive elephants and their handlers. The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter, defined as Experts' Rating (E-R). Mean Rating (M-R) representing the actual situation existing for the elephant/s was obtained through a ground survey. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.

The camp at Konni kept five elephants of different ages and sex. Three females were aged 7, 18 and 25 yrs while the two males were aged 10 and 66 yrs. All elephants were obtained from the wild. Two elephants, a 66 yrs male and a 25y female were captured from the wild. The remaining elephants (7 yrs, 18 yrs— both females, 10 yrs— male) were rescued from the wild as calves. M-R for source of animal was 2 indicating a deviation of 70% from E-R.

The elephants were maintained for timber hauling, for tourism related activities and for participating in festivals. M-R for 'purpose of keeping' was 2 showing a 75% deviation from E-R.

All elephants were kept under roofed shelters. Area of the shelter, inclusive for all other elephants, was 9m X 5m. The elephants spent 20h within this area. M-R for shelter was 3 implying a deviation of 64.6% from E-R.

Tap water drawn from a well was used for drinking; river was used for bathing/ drinking. Tap water was available in the shelter; the river was at a distance of 1km. Elephants were bathed once and the duration was 1 hr; materials used were coir and coconut husk. M-R was 5 with a deviation of 44% from E-R.

All elephants were allowed opportunity for interaction. While bathing/ walking, interaction through touch was possible; visual/ auditory/ olfactory interaction was 24 h as the elephants were chained within 2-3 m of each other. Elephants of different ages and sex formed the group with the oldest being a male (66 yrs). M-R was 4 showing a deviation of 46.3% from E-R.

All elephants were chained by their hind legs; foreleg also chained when the handler was not near his elephant. 1m chain used for tying forelegs and none of the elephants was allowed to free range. M-R was 0.4 showing a deviation of 95.3% from E-R.

All elephants were described as docile. There were no incidents of killing/ injury by the elephants. Two elephants, a 7 yrs old female and a 10 yrs old male, showed stereotypic signs of medium intensity. M-R was 5 with a deviation of 34.4% from E-R.

One adult female elephant was used for timber hauling, in festivals and for tourism; work duration was 2 hrs/ day. Howdah (made of iron with cushion) was used, weighing 100kgs, for carrying tourists. The 66 yrs male had been retired from work. M-R was 5 showing a deviation of 32.3% from E-R.

All elephants were given only stall feed. Food provided was: *Caryota* sp., coconut *Cocos nucifera*) and concentrate food consisting of a mixture of horse gram (*Macrotyloma uniflorum*), rice (*Oryza* sp.) or wheat (*Triticum aestivum*), ragi (*Eleusine coracana*), salt and mineral mixture. M-R was 5 with a deviation of 45.8% from E-R.

Oestrus cycles were reported for both adult female elephants. Both were exposed to males, but breeding was not reported. The adult male was reported to exhibit musth, had not bred/ sired offspring. M-R for female reproductive status was 4 with a deviation of 50% from E-R.

Occurrence of intestinal worms, constipation, indigestion, minor wounds were observed. Dung samples were examined once in three months and blood/ urine samples annually. M-R was 6 showing a deviation of 26.3% from E-R.

The elephants had access to a veterinary doctor with 14y experience in treating elephants. The doctor visited the center regularly/routinely. M- R was 6 with a deviation of 23% from E-R.

Ten handlers were employed to manage five elephants, of which, only one was permanently employed. The remaining handlers were hired on a temporary basis. One handler had more than 30 yrs of experience in this profession, the remaining had between 8-10 yrs of experience. The handlers used a short stick and ankush to control their elephants. All consumed alcohol. M-R was 5 with a deviation of 29% from E-R.

Overall M-R for elephant welfare status across all observed parameters was 4 with a deviation of 47.7% from E-R. Thirty six percent of the parameters showed deviations less than 10% from E-R implying its near suitability to norms prescribed by experts. The occurrence of deviation of 50% or more from E-R accounted for 48% of the observed parameters indicating greater deviation from E-R for nearly half of the observed features.

Introduction

The state forest department maintains a number of timber depots across the region. Among the depots, Konni camp harbors elephants to assist in hauling timber and other related operations. This camp is also famous for its ability to train calves rescued from the wild.

Objective

Captive situations provide a range of features which may/may not be suitable for elephants. Hence, this report aims to:

- Assess the welfare status of captive elephants by considering the physical/ social/ psychological features along with veterinary care
- Handlers' welfare status is equally important as they form a significant role in elephant management. Assessment of their socio-economic status has been considered

Method

The conditions experienced in captivity by elephants maybe diametrically different from those experienced by their wild counterparts. Considering their non-domestic nature, the ecological and biological needs of elephants have to be met in captivity, for welfare to be good/ captive conditions to be suitable. It is this deviation from the wild that has been considered for assessing welfare status of captive elephants. The greater the deviation, the poorer the welfare in captivity. Welfare status has been assessed by rating the existing conditions in captivity across a number of features.

Rating method

The rating scale from zero (unsuitable conditions) to ten (suitable conditions) was used to assess the welfare status of captive elephants and their handlers. Experts (both wild and captive elephant specialists, wildlife veterinary experts, managers from protected areas, managers responsible for both wild and captive elephants and other wildlife, personnel from welfare organisations and elephant handlers) were invited to assess the welfare based on different parameters and their significance through an exclusive workshop conducted on the subject (Varma, 2008; Varma, et al., 2008; Varma and Prasad, 2008). Experts rated a total of 114 welfare parameters covering major aspects of captivity.

- The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter. For example mean expert rating of 8.0 (SE= 0.5, N=29) for a parameter 'floor' and 9.0 (SE=0.4, N=31) for 'source of water' was arrived at from the ratings suggested by each expert by averaging across all the experts' values.
- A mean rating for each parameter, across all the participating experts, has been used as the Experts' Rating (E-R) which represents the importance attached to a parameter i.e., for a parameter with 8.0 as the maximum value, only 2.0 (25%) deviation and a parameter with maximum value 9.0, only 1.0 or 10% from the prescribed norm is considered acceptable.
- For example, if an elephant is exposed only to natural flooring, the animal receives a rating of 8 and for entirely unnatural flooring the value is 0; if animal is exposed to both natural and unnatural flooring, the value is 4 (as 8+0/2= 8/2= 4). If an elephant is

exposed to a natural water source, such as a river, it receives a value of 9; if the source of water is large lakes or reservoirs, it gets 4.5. A value of 3.5 is assigned for small water bodies like tanks and ponds. Tap water (running) gets 2.5 and if only buckets, pots, and tankers are in use, then the allocated value is 0.5. This rating is then averaged across all individual in that institution to get a Mean Rating (M-R) for that feature. Thus M-R represents the actual situation existing for the elephant/s.

- Therefore, using the maxima given by experts as a base, a rating scale starting from zero to the particular maximum value for that parameter has been used and the data for each animal was collected, in a given regime (for example, forest camp or temple).
- In this investigation, variables which represent a common feature of the captive situation have been grouped to form a parameter. The variables have been termed sub-parameters. For example, the variables shelter type, shelter size, floor type in the shelter; all represent different aspects of the physical space provided to the elephant. Hence, they are grouped together to form the parameter "Shelter" and each constituent variable is a sub-parameter. In this investigation, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters. The Mean Rating (M-R) for a parameter is the mean of M-Rs across related sub-parameters and denotes welfare status of existing conditions on the ground for the particular parameter.
- The number of such related parameters (sub-parameters) varies for each regime.
- Results have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the parameters observed. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.
- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) have been used to indicate the professional/ socio-economic status of value to the handler and his elephant.
- N* refers to number of sub-parameters observed. N refers to number of individuals.

Results

The camp at Konni kept five elephants of different ages and sex. Three females were aged between 7, 18 and 25y while the two males were aged 10 and 66y.

Source

Elephants undergo a drastic change in living conditions when moved from a wild, free-ranging state to a captive one. Even the young, orphaned/ lost wild calves which are rescued will undergo a change in their living conditions.

- All elephants were obtained from the wild
- Two elephants, a 66y male and a 25y female were captured from the wild
- The remaining elephants (7y, 18y— both females, 10y— male) were rescued from the wild as calves

M-R was 1.8 (SE= 0.8, N= 5) indicating a deviation of 70% from E-R.

Purpose of keeping
With availability of a natural physical environment, the concept of providing rehabilitation is perceived as being better than maintaining elephants in captivity purely for commercial exploitation.

- The elephants were maintained for timber hauling, for tourism related activities and participating in festivals.

M-R was 2.0 (N= 2) showing a 75% deviation from E-R.

Shelter
Wild elephants are exposed to a wide variety of landscapes; home ranges of 250-1000km^2 (elephants in India) have been recorded (Sukumar, 2006). This implies the need for vast physical space or at least a minimum viable space with diverse vegetation types.

- All elephants were kept under roofed shelters
- Area of the shelter, inclusive for all other elephants, was 9m X 5m
- Mud floor was provided
- The elephants spent 20h within this area

M-R was 2.8 (SE= 3.2, N*= 3) implying a deviation of 64.6% from E-R. Figures 1 and 2 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

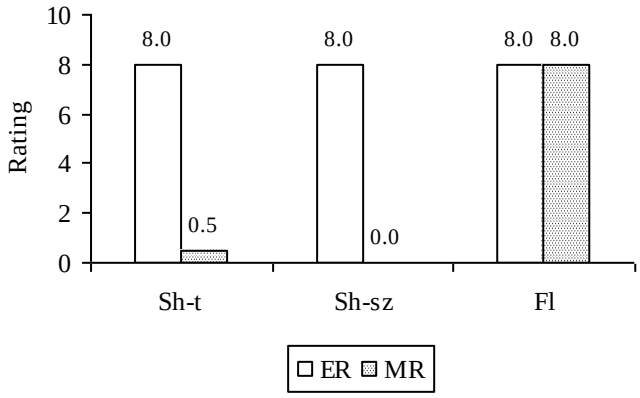


Figure 1: Comparison of E-R and M-R for ‘shelter’ sub-parameters

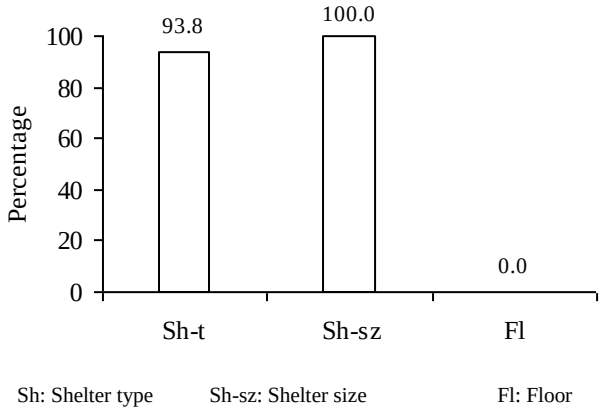


Figure 2: Percentage wise deviation from E-R for 'shelter' sub-parameters

Water and related parameters

Wild elephants have observed to drink water at least once per day, subject to its availability (Sukumar, 2006). The elephants perform a number of species-typical activities such as dust bathing/ mud-wallowing, socializing as part of their bathing activities. In captivity, handlers scrub the elephants while bathing. Hence, bathing materials have been rated.

- Tap water from a well within the camp was used for drinking; river was used for bathing/ drinking
- Tap water was available in the shelter; the river was at a distance of 1km
- The elephants were given water twice/ day; bathed once
- Bath duration was 1h; materials used were coir and coconut husk

M-R was 4.5 (SE= 10.8, N*= 7) with a deviation of 44% from E-R. Figures 3 and 4 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

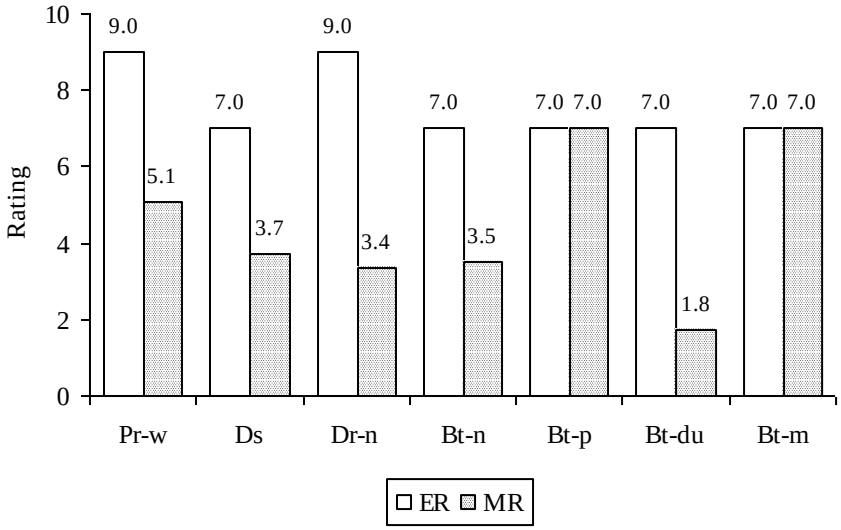
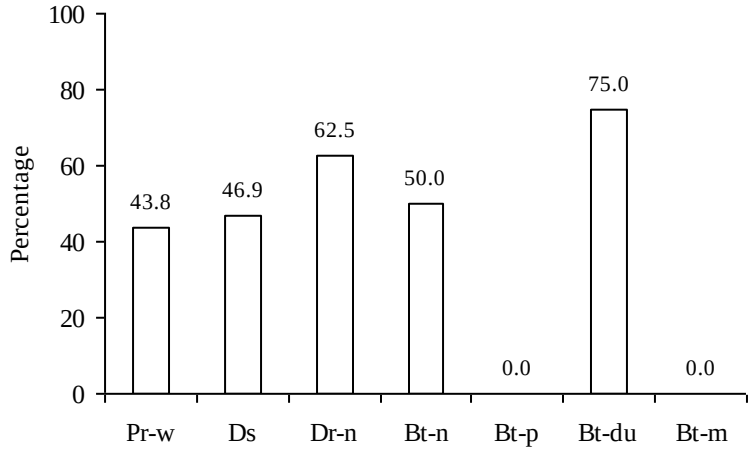


Figure 3: Comparison of E-R and M-R for 'water' sub-parameters



Pr-w: Availability of perennial source of running water Ds: Distance to water source
Dr-n: Number of times drinking water Bt-n: Number of times bathed Bt-p: Bathing place
Bt-du: Bath duration Bt-m: Bathing materials

Figure 4: Percentage wise deviation from E-R for 'water' sub-parameters

Sleep

Restricted sleeping area/ inability to move freely can cause health problems in the long-term. It can also lead to absence of opportunity to perform species-specific behaviours.

- The shelter was also the sleeping place for all elephants

M-R for sleeping place was 4.0 (SE= 0.0, N= 5) with a deviation 50% from E-R.

Walk

Wild elephants forage for most parts of day (Sukumar, 2006), traversing across the landscape. Hence, opportunity to walk on suitable surfaces is an important activity.

- All elephants were given opportunity to walk
- Time of walk was from 10a.m. to 12noon

M-R was 9.0 (SE= 0.0, N= 5) for opportunity to walk, with no deviation from E-R.
M-R was 6.0 (SE= 0.0, N= 5) for time of walk, with a deviation of 25% from E-R.

Social interaction

Elephant society is known for maintaining long-lasting relationships across generations (Sukumar, 2003), indicating its importance to elephant life. In captivity, this is restricted by various factors. At times, even with the presence of other elephants, physical interaction is not possible due to chaining. Restriction on movement also reduces or obstructs opportunities to flee/ fight depending on the context.

- All elephants were allowed opportunity for interaction

- While bathing/ walking, interaction through touch was possible; visual/ auditory/ olfactory interaction was 24h as the elephants were chained within 2-3m of each other
- Elephants of different ages and sexes formed the group, with the oldest being a male (66y)

M-R was 4.3 (SE= 1.9, N*= 4) showing a deviation of 46.3% from E-R. Figures 5 and 6 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

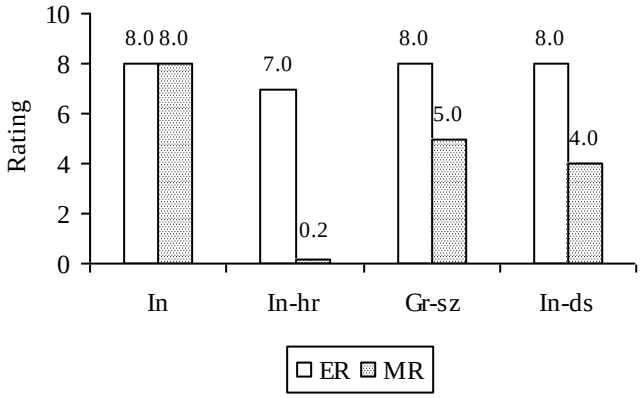
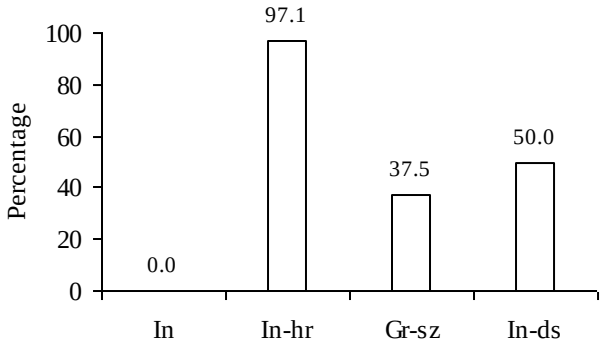


Figure 5: Comparison of E-R and M-R for 'interaction' sub-parameters



In: Opportunity for interaction In-hr: Hours of interaction Gr-sz: Group size In-ds: Interaction distance

Figure 6: Percentage wise deviation from E-R for 'interaction' sub-parameters

Chaining

Chaining of elephants is resorted to in captivity as a way of managing them either due to lack of space/ due to inability to retrieve the animal when needed/ as a way of controlling the animal or for convenience.

- All elephants were chained by their hind legs; foreleg also chained when handler was not near elephant

- 1m chain used for tying forelegs
- None of the elephants was allowed to free range

M-R was 0.4 (SE= 0.4, N*= 4) showing a deviation of 95.3% from E-R. Figure 7 and 8 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

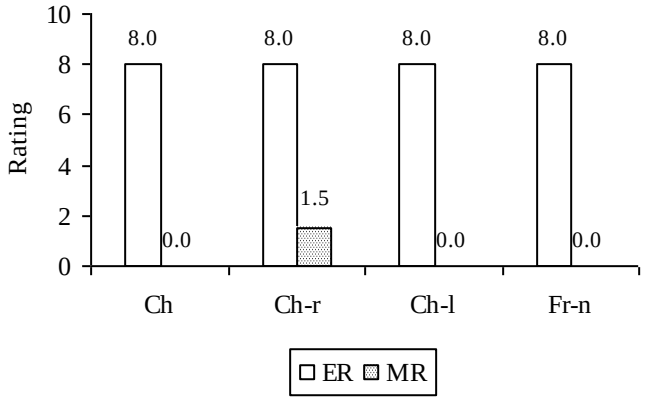
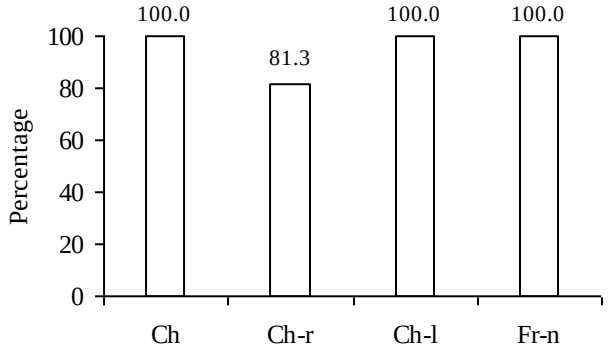


Figure 7: Comparison of E-R and M-R for 'chaining' sub-parameters



Ch: Chaining status Ch-r: Chaining region Ch-l: Chain length (foreleg)
Fr-n: Opportunity to free range at night

Figure 8: Percentage wise deviation from E-R for 'chaining' sub-parameters

Observed behaviour

A calm temperament in elephants may lead to easy handling of the animal. In addition, occurrence of abnormal behaviours such as stereotypy may indicate poor welfare conditions.

- All elephants were described as docile
- There were no incidents of killing/ injury by the elephants
- Two elephants, a 7y old female and a 10y old male, showed stereotypic signs of medium intensity

M-R was 5.3 (SE= 2.4, N*= 4) with a deviation of 34.4% from E-R. Figures 9 and 10 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

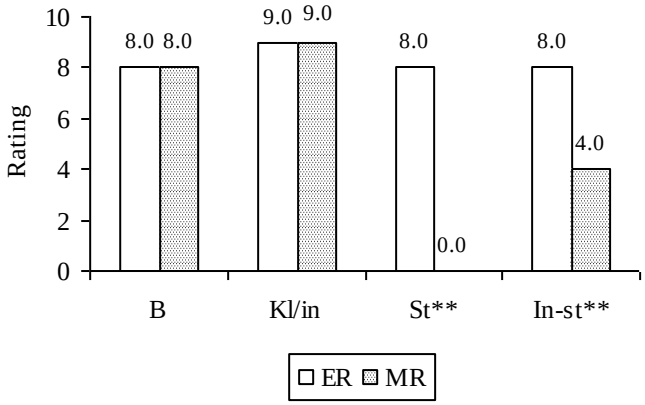
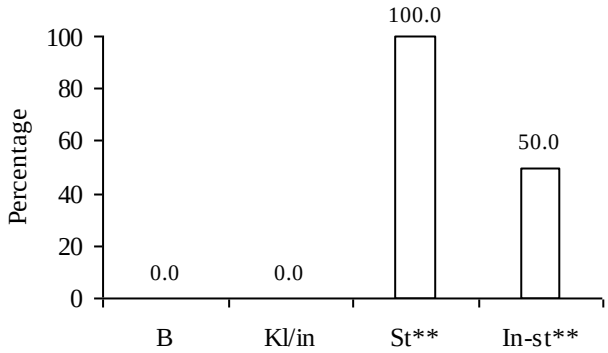


Figure 9: Comparison of E-R and M-R for 'behaviour' sub-parameters



B: Observed behaviour Kl/In: Incidents of killing/ injury by elephants St: Occurrence of stereotypy
In-st: Intensity of stereotypy
**: Observed for two elephants only

Figure 10: Percentage wise deviation from E-R for 'behaviour' sub-parameters

Work

Maintaining elephants purely for work may compromise living conditions of the animals.

- One adult female elephant was used for work; a 66y male had been retired from work
- The female elephant was used for timber hauling, for festivals and for tourism
- Work duration was 2h/ day; number of working days was 100
- Howdah (made of iron with cushion) was used, weighing 100kgs, for carrying tourists
- Shade, water and food was available while working

M-R was 5.4 (SE= 1.4, N*= 6) showing a deviation of 32.3% from E-R. Figures 11 and 12 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

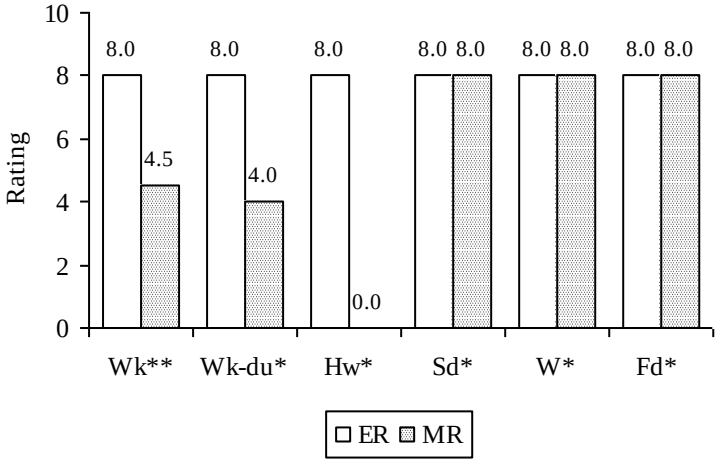
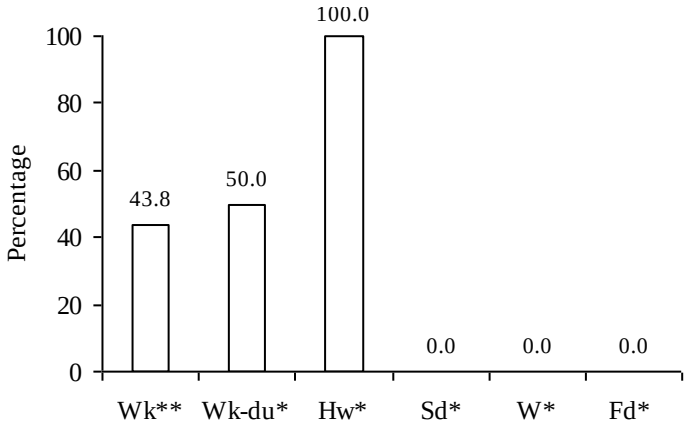


Figure 11: Comparison of E-R and M-R for 'work' sub-parameters



Wk: Work type Wk-du: Work duration Hw: Howdah weight Sd: Shade availability
W: Water availability Fd: Food availability

Figure 12: Percentage wise deviation from E-R for 'work' sub-parameters

Food

A number of plant species are eaten by wild elephants (Sukumar, 2006), this diversity is impossible to achieve when the animals are provided only stall feed. Foraging forms a major activity for elephants, occupying 12-18h/day. This activity not only involves feeding, it also ensures walking, socializing, opportunity to learn to recognize food plants.

- All elephants were given only stall feed
- Food provided was: *Caryota* sp., coconut *Cocos nucifera*) and concentrate food consisting of a mixture of horse gram (*Macrotyloma uniflorum*), rice (*Oryza* sp.) or wheat (*Triticum aestivum*), ragi (*Eleusine coracana*), salt and mineral mixture
- Ration chart was maintained

M-R was 4.9 (SE= 2.2, N*= 4) with a deviation of 45.8% from E-R. Figures 13 and 14 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

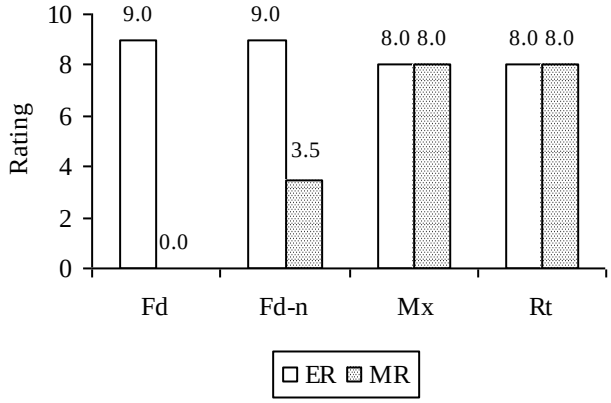
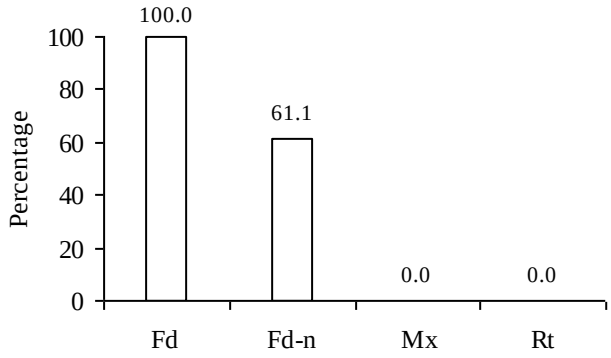


Figure 13: Comparison of E-R and M-R for 'food' sub-parameters



Fd: Food provisioning type Fd-n: Number of stall fed items Mx: Provision of mineral mixture
Rt: Usage of ration chart

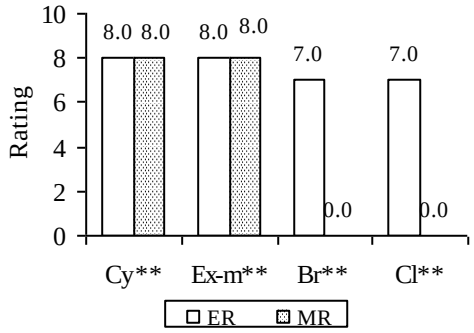
Figure 14: Percentage wise deviation from E-R for 'food' sub-parameters

Reproductive status

Elephants that are healthy will express normal reproductive functioning (Kurt and Garai, 2007). Lack of opportunities to express appropriate reproductive behaviour will restrict species-appropriate behaviours.

- Oestrus cycles were reported for both adult female elephants
- Both were exposed to males, but breeding was not reported
- Calf birth was not reported for both females
- The adult male was reported to exhibit musth, had not bred/ sired offspring
- The male was aggressive during musth and was chained for a period of 1.5-2 months during its musth

M-R for female reproductive status was 4.0 (SE= 2.7, N*= 4) with a deviation of 50% from E-R. Figure 15 and 16 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters. M-R for 'male reproductive status' was 0.0 (SE= 0.0, N*= 5) with a deviation of 100% from E-R. Figures 17 and 18 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.



**: observed for two elephants
Cy: Occurrence of oestrus cycles Ex-m: Exposure to males Br: Opportunity to breed Cl: Calf birth

Figure 15: Comparison of E-R and M-R for female reproductive status

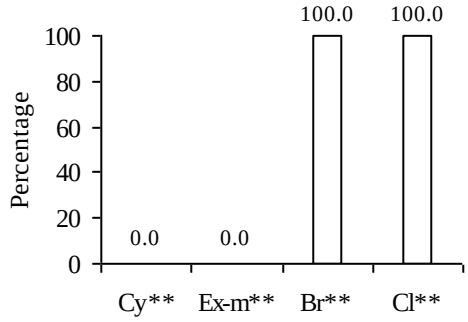
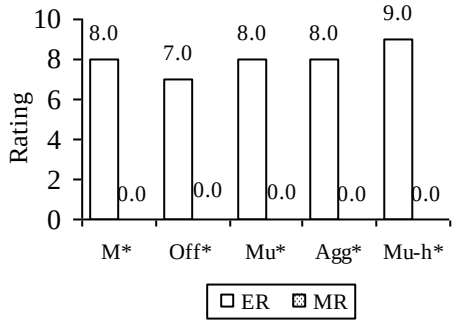


Figure 16: Percentage wise deviation from E-R for female reproductive status



*: observed for one elephant
M: Opportunity to breed Off: Offspring sired Mu: Occurrence of musth Agg: Aggression during musth
Mu-h: Handling of musth

Figure 17: Comparison of E-R and M-R for 'male reproductive status'

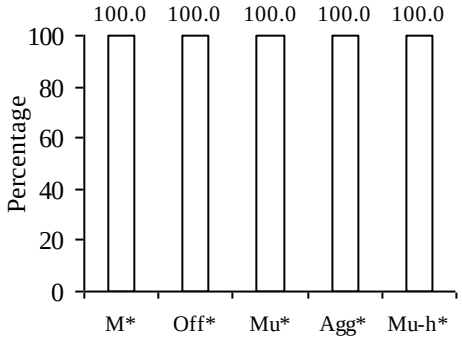


Figure 18: Percentage wise deviation from E-R for male reproductive

Health status and veterinary protocol

When the activity of elephants is altered, from a pattern of being on the move for most parts of a day to one of being stationary, the animals maybe subjected to health issues in the long-term. In captivity, a series of veterinary procedures is performed to maintain good physical health.

- The following conditions were observed: occurrence of intestinal worms, constipation, indigestion, minor wounds
- Deworming was done once in six months or annually;
- Medicated oil was applied on the body
- None of the elephants was immunized
- Dung samples were examined once in three months and blood/ urine samples annually

M-R was 5.9 (SE= 1.3, N*= 6) showing a deviation of 26.3% from E-R. Figures 19 and 20 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

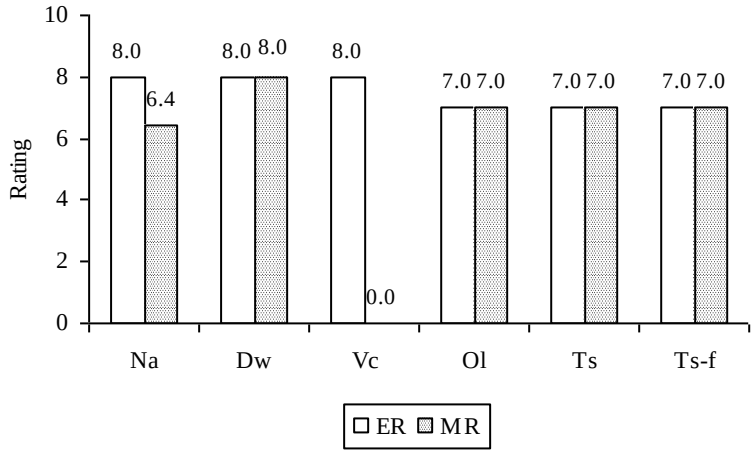
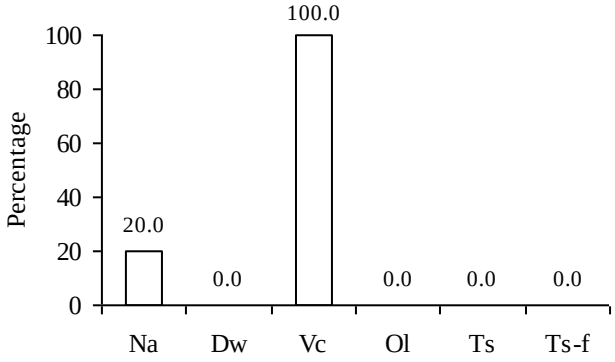


Figure 19: Comparison of E-R and M-R for 'health status' sub-parameters



Na: Nature of disease/ injury Dw: Deworming status Vc: Vaccination status Ol: Oiling status
Ts: Sample tests of dung/ urine/ blood Ts-f: Frequency of sample testing

Figure 20: Percentage wise deviation from E-R for 'health status' sub-parameters

Veterinary personnel and facilities

Availability of veterinary personnel with relevant experience has been considered for rating. Occurrence of suitable infrastructure such as veterinary care unit/ accommodation for staff, etc., is perceived to be a part of efficient management of the captive center.

- The elephants had access to a veterinary doctor with 14y experience in treating elephants
- The doctor visited the center regularly/routinely
- Veterinary assistant was not available
- Veterinary care unit, cooking shed, food preparation hall, provision shed, kraals, animal stand and camp site were available; accommodation for staff was not available

M- R was 6.2 (SE= 1.5, N*= 6) with a deviation of 23% from E-R. Figures 21 and 22 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

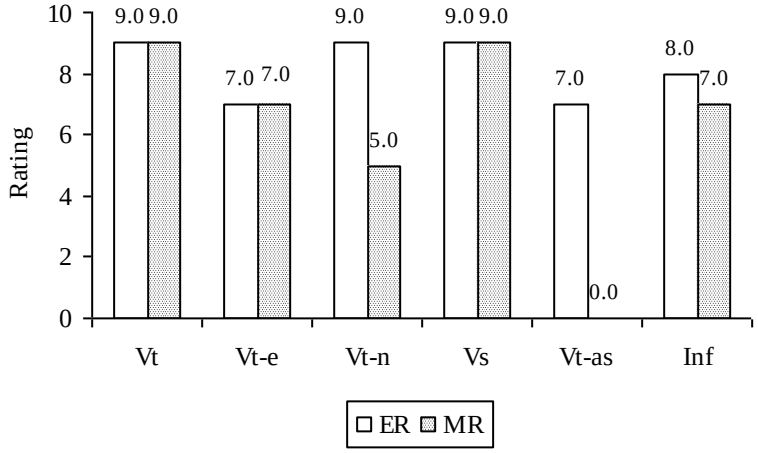
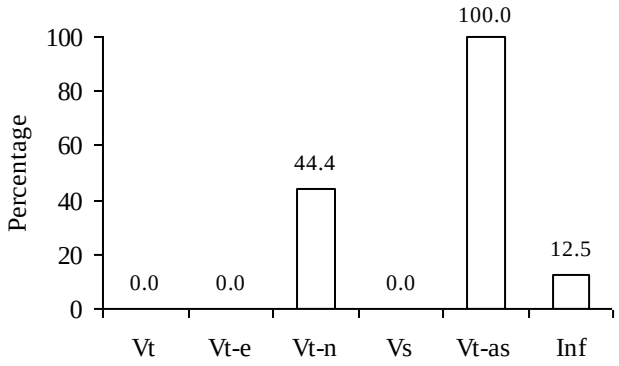


Figure 21: Comparison of E-R and M-R for 'veterinary personnel' sub-parameters



Vt: Availability of veterinary doctor Ex-e: Experience with elephants Ex-n: Number of years of experience
Vs: Frequency of visits Vt-as: Availability of veterinary assistant Inf: Infrastructure (facilities available)

Figure 22: Percentage wise deviation from E-R for 'veterinary personnel' sub-parameters

Handler's socio-economic status

The social and economic status of handlers has a direct association with their welfare as poor remuneration or low social perception of self can lead to dissatisfaction. This can also affect the way elephants are handled.

- Ten handlers were employed to manage five elephants, of which, only one was permanently employed. The remaining handlers were hired on a temporary basis
- One handler had more than 30y experience in this profession, the remaining had between 8-10y experience
- All were literate
- The handlers used a short stick and ankush to control their elephants
- All were covered by insurance, paid by the forest department
- All consumed alcohol

M-R was 4.6 (SE= 1.7, N*= 5) with a deviation of 37% from E-R. Figures 23 and 24 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

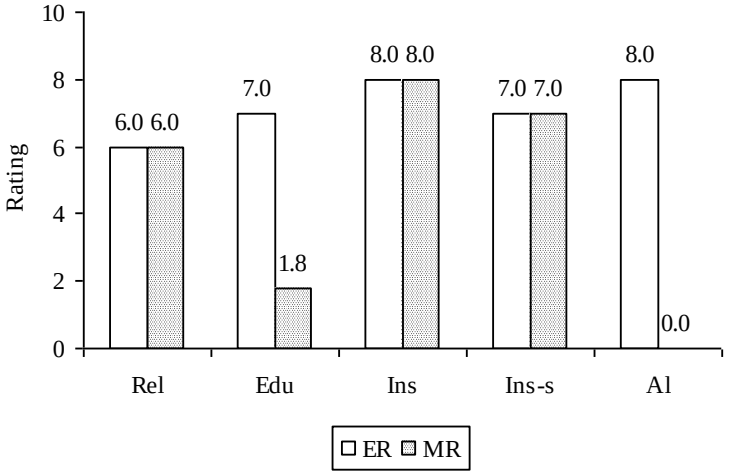
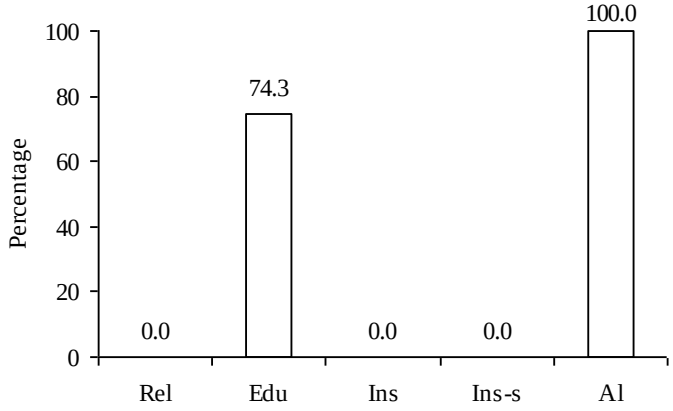


Figure 23: Comparison of E-R and M-R for 'handlers' socio-economic status' sub-parameters



Rel: Relatives in this profession Edu: Education levelIn: availability of insurance In-s: Source of insurance
Al: Consumption of alcohol

Figure 24: Percentage wise deviation from E-R for 'handlers' socio-economic status' sub-parameters

Overall Welfare Status

Overall M-R, considering all observed parameters, was 4.2 (SE= 0.4, N*= 58) with a deviation of 47.7% from E-R. Figure 25 gives the distribution of deviations from E-R across the observed parameters. 36% of the parameters showed deviations less than 10% from E-R implying its near suitability to norms prescribed by experts.

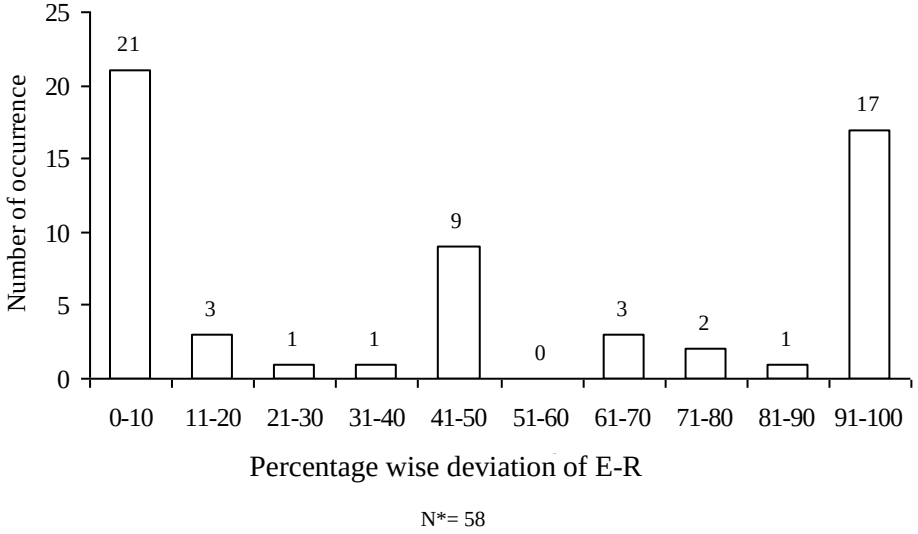


Figure 25: Distribution of Percentage wise deviation from E-R for observed parameters

The occurrence of deviations of 50% or more from E-R accounted for 48% of the observed parameters indicating greater deviation from E-R for nearly half of the observed features. These were distributed across all the major categories such as shelter, water, food, social interaction and reproduction.

Discussion

Non-provision of features representative of elephant biology/ behaviour enforces alien conditions for the elephants. It is this deviation which has been used to rate the welfare status of elephants.

Features which showed 50% or more deviation from E-R:

- The elephants were confined to a limited space of 9m X 5m for 20h of the day. Even though flooring was natural, excreta from the animals may accumulate leading to unhygienic conditions
- The absence of free movement was a major impediment to performance of species-typical activities. The distances covered by wild elephants, their activity pattern were all absent due to this reason. In contrast to their daily movements in the wild, the elephants walked for a duration of two hours only, from 10a.m. to 12noon
- Inability to move freely also restricted access to water sources
- While elephants of different ages and sex were available, they could not engage in interaction involving touch; in conflict situations, there was no opportunity to flee as they were all tethered
- Kurt and Garai (2001) report on the occurrence of stereotypy among orphaned animals in Sri Lanka, elephants which were unable to move freely due to being tied or

due to poor social integration into the herd, showed stereotypic signs. In this camp, both young elephants, a male (10y) and a female (7y) showed stereotypic signs

- Wild elephants forage for most parts of a day indicating their activity pattern. All the elephants in this camp were given only stall feed, thus, not only restricting the variety of food plants available but also the movement (and hence, exercise and psychological stimulation) consequent to foraging
- Both adult females had not given birth to calves, even though they were exhibiting oestrus cycles. This was true for the male also, which exhibited signs of musth but had not sired any offspring

Mahout status

Based on the available information, it appears that the handlers with a traditional background of working with elephants opt for this profession. This, however, needs verification based on further studies/ surveys.

One practice with a likely negative effect was the prevalence of alcohol consumption among all the handlers.

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Unlimited Plus Action (CUPA) and Asian Nature Conservation Foundation (ANCF), Bangalore, India.

Section 2e:
Captive Elephants in Kodanad Forest Camp

Executive summary

Kodanad in Ernakulam district is home to five captive elephants maintained by the Forest Department for timber hauling and tourism related activities.

The welfare was assessed based on a rating scale. The rating scale from unsuitable conditions to suitable conditions was used to assess the welfare status of captive elephants and their handlers. The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter, defined as Experts' Rating (E-R). Mean Rating (M-R) representing the actual situation existing for the elephant/s was obtained through the ground survey. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.

Kodanad FC maintained five elephants (four females, one male); mean age of females was 12y (ranging from 2.5- 38y); the lone male was 12y; 80% of the elephants were aged less than 15 years.

Three elephants aged less than 15 yrs were rescued from the wild, the lone male was captive born. A single adult female, 38 yrs, had been captured from the wild. M-R was 3 indicating a deviation of 50% from E-R.

The adult female was used for timber hauling, tourism and festivals. The younger animals were being trained for both these activities. M-R was 3 showing a deviation of 66.3% from E-R.

All the elephants were maintained on mud flooring when chained. The elephants were chained for 15h/day, using 1m length of chain; thus, effective physical space during this period would be 3.14m^2. M-R was 4 with a deviation of 45.4% from E-R.

Tap water was available in the shelter. River was accessed at a distance of 200m from the shelter. The bathing place was the river and the duration was 1-1.5 hrs; bathing materials used were coir and coconut husk. M-R was 6 showing a deviation of 29% from E-R.

The elephants were allowed to interact only during bathing/walking. Hours/ day were from 10a.m. to 12 noon. Number of individuals was five with an adult female and young elephants ranging from 2.5 to 12y (of both sexes). M-R was 4 showing a deviation of 48% from E-R.

All elephants were chained for 15hrs/day with1m chain tied to the leg. There was no opportunity to free range. M-R was 1with a deviation of 87.5% from E-R.

All elephants were described as docile. There were no reports of injury/killing by the animals. Stereotypic behaviour of medium intensity was observed among three elephants (all aged less than 5 yrs). M-R was 5 with a deviation of 34% from E-R.

The 38y old female was used for timber hauling, for tourism and in festivals. The elephant was sent for 25 festivals/ year. Iron howdah with cushion was used for carrying tourists,

howdah weight was 80 kg. All the young elephants (male and females) were under training and not used for work. M-R was 4 showing a deviation of 56% from E-R.

All the elephants were given only stall feed. Food provided was: *Caryota* sp., coconut/ coconut leaves (*Cocos nucifera*), occassionally grass and concentrate food consisting of a mixture of horse gram (*Macrotyloma uniflorum*), rice (*Oryza* sp.) or wheat (*Triticum aestivum*), ragi (*Eleusine coracana*), salt and mineral mixture. M-R was 5 with a deviation of 43.1% from E-R

Oestrus cycle was reported for the adult female. Mating was reported with a wild male; one calf was born. M-R was 4 with a deviation of 54.6% from E-R.

The elephants had incidents of worm infestation, occasional constipation, indigestion and wounds. Dung sample tests were done once in three months, urine/ blood test was done annually. M-R was 6 showing a deviation of 26.3% from E-R.

Veterinary doctor was available for all elephants. Frequency of visits was once in a month. A veterinary hospital was located close to the camp. M- R was 6 with a deviation of 29.6% from E-R.

Ten handlers were employed for managing five elephants. The permanently employed mahout had more than 25 yrs of experience in this profession; remaining were temporarily employed with > 15y experience. The permanently employed mahout was given a salary of Rs. 1, 20,000/-, others were given Rs. 54,000/- annually. Except one, all handlers consumed alcohol. M-R was 6 with a deviation of 27.5% from E-R.

Overall M-R for elephants, considering all observed parameters together, was 4.5 showing a deviation of 44% from E-R. Forty one percent of the parameters did not show any deviation from E-R implying occurrence of near ideal features. This was, however, offset by the occurrence of large percentage (52%) of the parameters accounting for a deviation of 50% or more from E-R implying greater deviation from E-R for more than half the observed parameters.

Introduction
Kodanad in Ernakulam district harbors a camp maintained by the state forest department. This is also home to captive elephants maintained by the department for timber hauling and tourism related activities.

Objective
The conditions provided for elephants in captivity may differ, depending on the management. Hence, it is important to know the status of captivity through its effect on the elephants' welfare. This report aims to:

- Assess the welfare status of elephants through a survey of the existing ecological/ biological and health related features

The status of handlers is important considering their integral role in managing elephants. This report also aims to:

- Assess the socio-economic status of handlers

Method
Elephants cannot be considered to be domesticated (Lair, 1997); their ecological and biological needs have to be met with when kept in captivity. Using the information available on wild elephants, the change in living conditions experienced by captive elephants has been compared, as a way of assessing the welfare of the elephants. The greater the deviation, the poorer the welfare. This deviation has been rated using a scale developed by experts from different fields.

Rating method
The rating scale from zero (unsuitable conditions) to ten (suitable conditions) was used to assess the welfare status of captive elephants and their handlers. Experts (both wild and captive elephant specialists, wildlife veterinary experts, managers from protected areas, managers responsible for both wild and captive elephants and other wildlife, personnel from welfare organisations and elephant handlers) were invited to assess the welfare based on different parameters and their significance through an exclusive workshop conducted on the subject (Varma, 2008; Varma, et al., 2008; Varma and Prasad, 2008). Experts rated a total of 114 welfare parameters covering major aspects of captivity.

- The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter. For example mean expert rating of 8.0 (SE= 0.5, N=29) for a parameter 'floor' and 9.0 (SE=0.4, N=31) for 'source of water' was arrived at from the ratings suggested by each expert by averaging across all the experts' values.
- A mean rating for each parameter, across all the participating experts, has been used as the Experts' Rating (E-R) which represents the importance attached to a parameter i.e., for a parameter with 8.0 as the maximum value, only 2.0 (25%) deviation and parameter with maximum value 9.0 only 1.0 or 10% from the prescribed norm is considered acceptable.
- For example, if an elephant is exposed only to natural flooring, the animal receives a rating of 8 and for entirely unnatural flooring the value is 0; if the animal is exposed

to both natural and unnatural flooring, the value is 4 (as 8+0/2= 8/2= 4). If an elephant is exposed to a natural water source, such as a river, it receives a value of 9; if the source of water is large lakes or reservoirs, it gets 4.5. A value of 3.5 is assigned for small water bodies like tanks and ponds. Tap water (running) gets 2.5 and if only buckets, pots, and tankers are in use, then the allocated value is 0.5. This rating is then averaged across all individuals in that institution to get a Mean Rating (M-R) for that feature. Thus M-R represents the actual situation existing for the elephant/s.

- Therefore, using the maxima given by experts as a base, a rating scale starting from zero to the particular maximum value for that parameter has been used and the data for each animal was collected, in a given regime (for example, forest camp or temple).
- In this investigation, variables which represent a common feature of the captive situations have been grouped to form a parameter. The variables have been termed sub-parameters. For example, the variables shelter type, shelter size, floor type in the shelter; all represent different aspects of the physical space provided to the elephant. Hence, they are grouped together to form the parameter "Shelter" and each constituent variable is a sub-parameter. In this investigation, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters. The Mean Rating (M-R) for a parameter is the mean of M-Rs across related sub-parameters and denotes welfare status of existing conditions on the ground for the particular parameter.
- The number of such related parameters (sub-parameters) varies for each regime.
- Results have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the parameters observed. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.
- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) have been used to indicate the professional/ socio-economic status, of value to the handler and his elephant.
- N* refers to number of sub-parameters observed. N refers to number of individuals.

Results

Kodanad FC maintained five elephants (four females, one male); mean age of females was 12y (ranging from 2.5- 38y); the lone male was 12y; 80% of the elephants (N=5) were aged less than 15y.

Source

Sourcing of elephants from the wild, subjects the animals to a greater change of living conditions as compared to those rescued at a young age from the wild.

- Three elephants aged less than 15y were rescued from the wild
- A 12y old male was born in captivity
- A single adult female, 38y, had been captured from the wild.

M-R was 3.0 (SE= 1.1, N= 5) indicating a deviation of 50% from E-R.

Purpose of keeping
Keeping elephants purely for commercial purposes or as a place to harbour rescued animals can have an effect on the animals through the living conditions they are exposed to. The purpose of keeping has an effect on the captive conditions.

- The adult female was used for timber hauling, tourism and festivals
- The younger animals were being trained

M-R was 2.7 (SE= 0.0, N= 5) showing a deviation of 66.3% from E-R.

Shelter
Considering the vast distances covered by wild elephants as they forage/ perform species-typical activities, physical space in captivity has been rated.

- All the elephants were maintained on mud flooring when chained
- Shade was available in the form of trees
- The elephants were chained for 15h/day, using 1m length of chain; thus, effective physical space during this period would be 3.14m^2
- The shelter was cleaned 3 times/ day

M-R was 4.4 (SE= 2.0, N*= 6) with a deviation of 45.4% from E-R. Figures 1 and 2 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

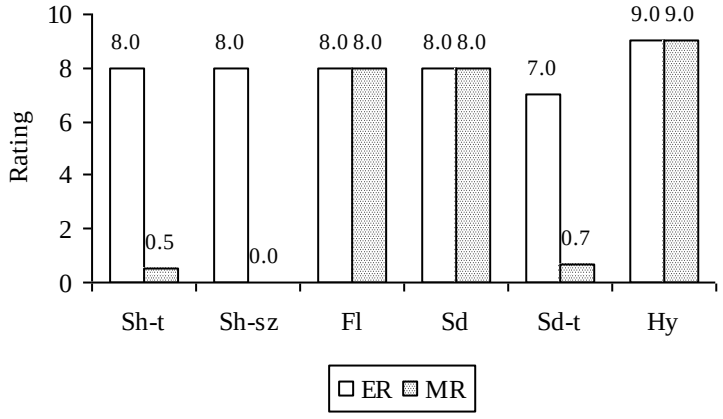


Figure 1: Comparison of E-R and M-R for ‘shelter’ sub-parameters

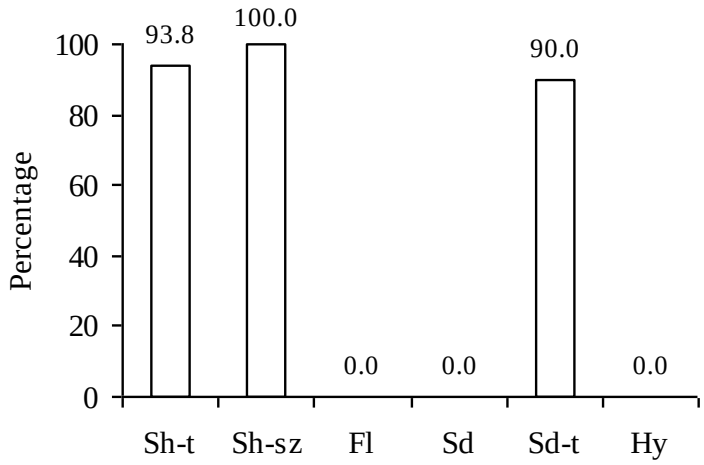


Figure 2: Percentage wise deviation from E-R for 'shelter' sub-parameters

Water and related parameters

Subject to availability, wild elephants are known to drink water at least once a day (Sukumar, 1991). A number of species-typical activities such as wallowing/ dust bathing/ socializing are associated with the act of drinking water/ bathing. In captivity, handlers generally bathe the elephants. Hence, materials used as scrub has been rated.

- Tap water was available in the shelter
- River was accessed at a distance of 200m from the shelter
- Both sources were used for drinking/ bathing
- The elephants were reported to drink water three times/ day and bathed twice per day; bathing place was river
- Bath duration was 1-1.5h; bathing materials used were coir and coconut husk

M-R was 5.7 (SE= 0.7, N*= 7) showing a deviation of 29% from E-R. Figures 3 and 4 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

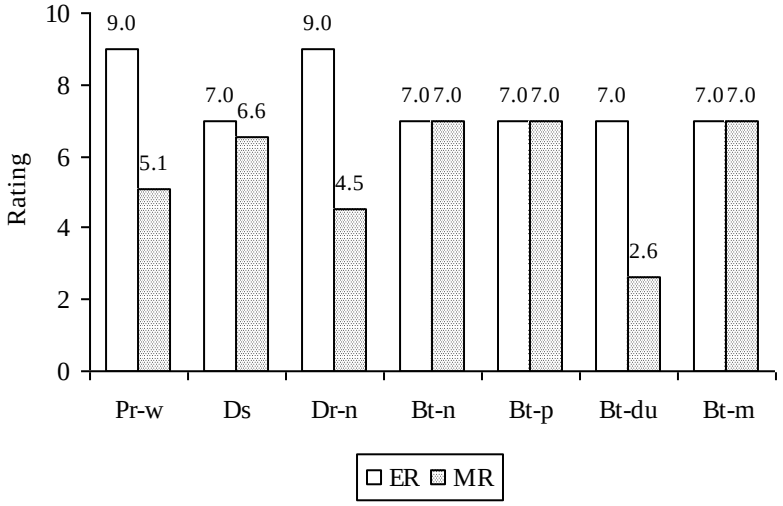
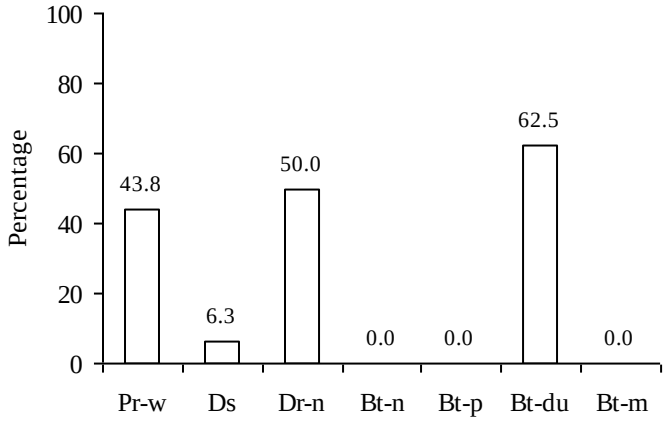


Figure 3: Comparison of E-R and M-R for 'water' sub-parameters



Pr-w: Availability of perennial source of running water Ds: Distance to water source
Dr-n: Number of times drinking water Bt-n: Number of times bathed Bt-p: Bathing place
Bt-du: Bath duration Bt-m: Bathing materials

Figure 4: Percentage wise deviation from E-R for 'water' sub-parameters

Sleep

Unsuitable sleeping places or restricted movement while sleeping may cause health problems and also inhibit performance of natural behaviours.

- All elephants were chained at night; exposed to mud floor
- Length of chain was 1m

M-R for sleeping place was 4.0 (SE= 0.0, N= 5) with a deviation of 50% from E-R.
M-R for sleep area (size) was 1.0 (SE= 0.0, N= 5) with a deviation of 87.5% from E-R.

Walk
Opportunity to walk on suitable surfaces and allowance for unrestricted space/ time can replicate near-natural condition for elephants in captivity.

- All the elephants were walked between 10a.m. to 12 noon
- Opportunity to walk was provided while being taken for bath to river

M-R for opportunity to walk was 9.0 (SE= 0.0, N= 5) showing no deviation from E-R. M-R for time of walk was 6.0 (SE= 0.0, N= 5) with a deviation of 25% from E-R.

Social interaction
Presence of and unrestricted access to other elephants within the institution is considered integral to elephant welfare as elephants are known for maintaining their social relationships across generations (Sukumar, 2003).

- The elephants were allowed to interact only during bathing/ walking
- Hours/ day was from 10a.m. to 12 noon
- Number of individual was five with an adult female and young elephants ranging from 2.5 to 12y (of both sexes)

M-R was 4.1 (SE= 2.7, N*= 3) showing a deviation of 548% from E-R. Figures 5 and 6 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

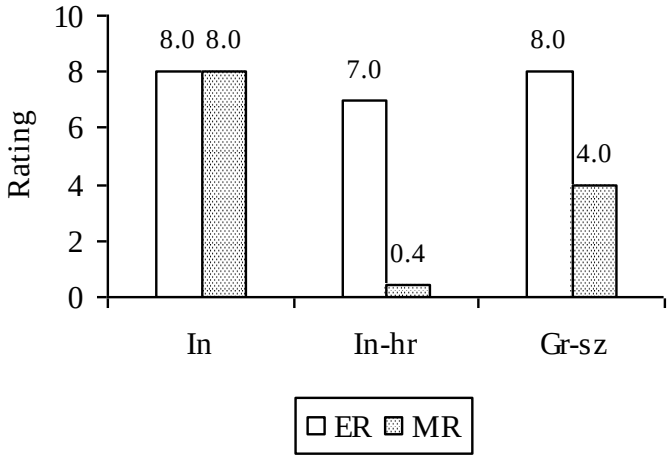
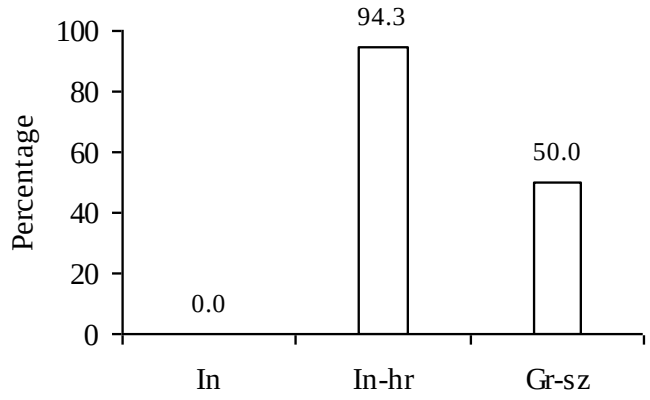


Figure 5: Comparison of E-R and M-R for ‘interaction’ sub-parameters



In: Opportunity for interaction In-hr: Hours of interaction Gr-sz: Group size

Figure 6: Percentage wise deviation from E-R for 'interaction' sub-parameters

Chaining

The use of chains on captive elephants has multiple consequences on the animals through its effect on curbing expression of species-specific behaviours.

- All elephants were chained for 15h/day with 1m chain tied to the leg
- There was no opportunity to free range

M-R was 1.0 (SE= 0.7, N*= 4) with a deviation of 87.5% from E-R. Figures 7 and 8 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

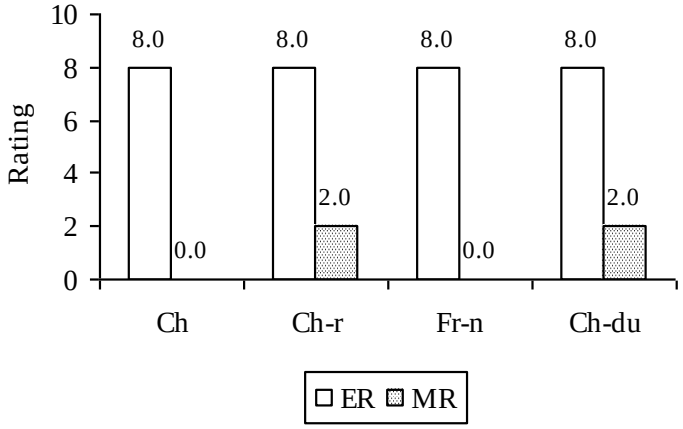


Figure 7: Comparison of E-R and M-R for 'chaining' sub-parameters

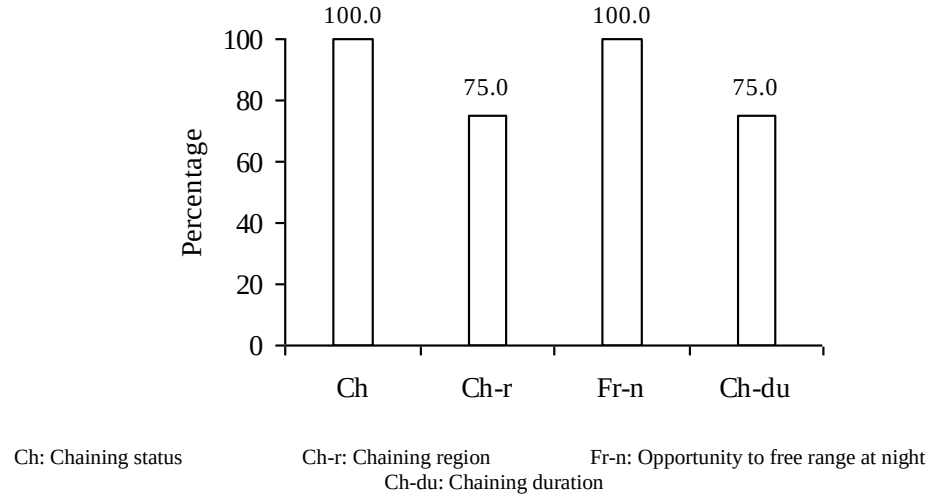


Figure 8: Percentage wise deviation from E-R for 'chaining' sub-parameters

Observed behaviour

Elephants which are aggressive or nervous may be difficult to handle as compared to those which are calm. Occurrence of stereotypy is an indication of poor living conditions.

- All elephants were described as docile
- There were no reports of injury/ killing by the animals
- Stereotypic behaviour of medium intensity was observed among three elephants (all aged less than 5y)

M-R was 5.3 (SE= 2.4, N*= 4) with a deviation of 34% from E-R. Figures 9 and 10 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

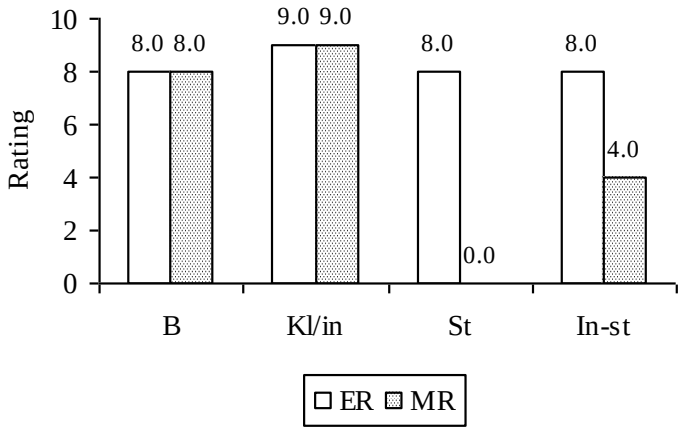


Figure 9: Comparison of E-R and M-R for 'behaviour' sub-parameters

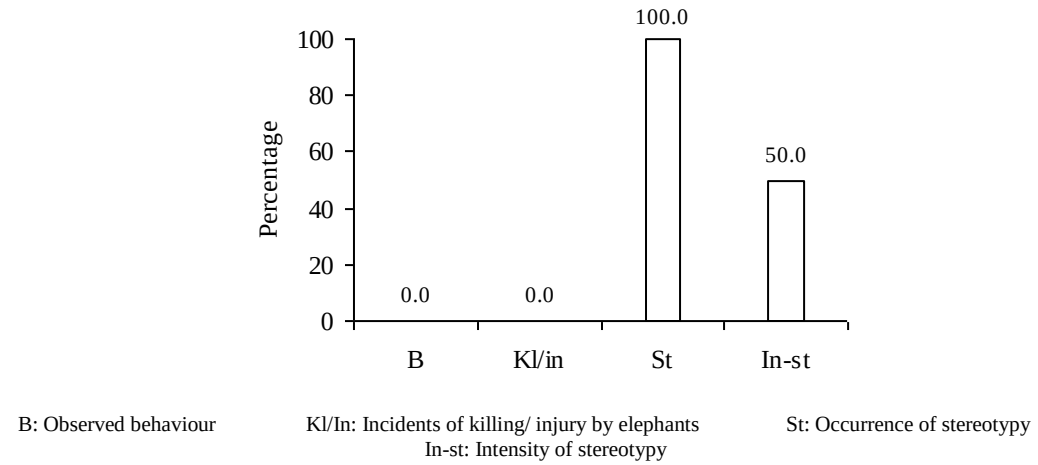


Figure 10: Percentage wise deviation from E-R for 'observed behaviour' sub-parameters

Work

Use of elephants for work which approximates natural behaviours is considered to be better than one which imposes alien conditions on the animals.

- The 38y old female was used for timber hauling, for tourism and in festivals. All the young elephants were under training and not used for work
- The elephant was sent for 25 festivals/ year, location was close to the camp; maximum duration for which the elephant stood per festival was 2h
- Number of working days in camp was 200 days; 30 days for timber hauling
- Iron howdah with cushion was used for carrying tourists, howdah weight was 80kgs
- Shade, water and food was available while working

M-R was 3.5(SE= 1.7, N*= 7) showing a deviation of 56% from E-R. This rating refers to the single animal used for work. Figures 11 and 12 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

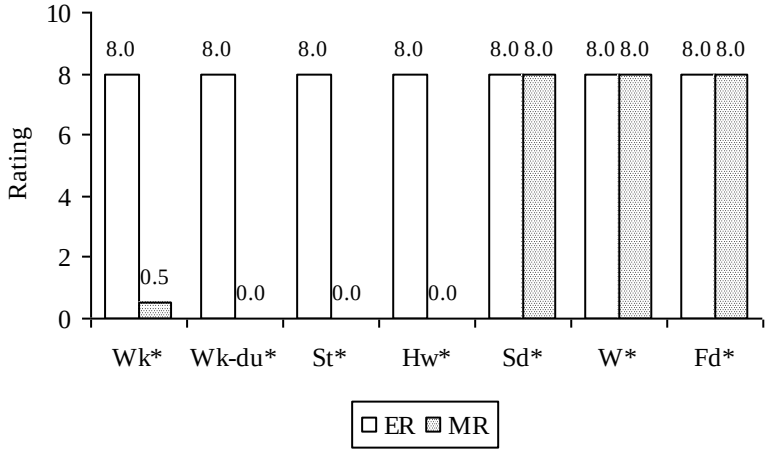


Figure 11: Comparison of E-R and M-R for 'work' sub-parameters

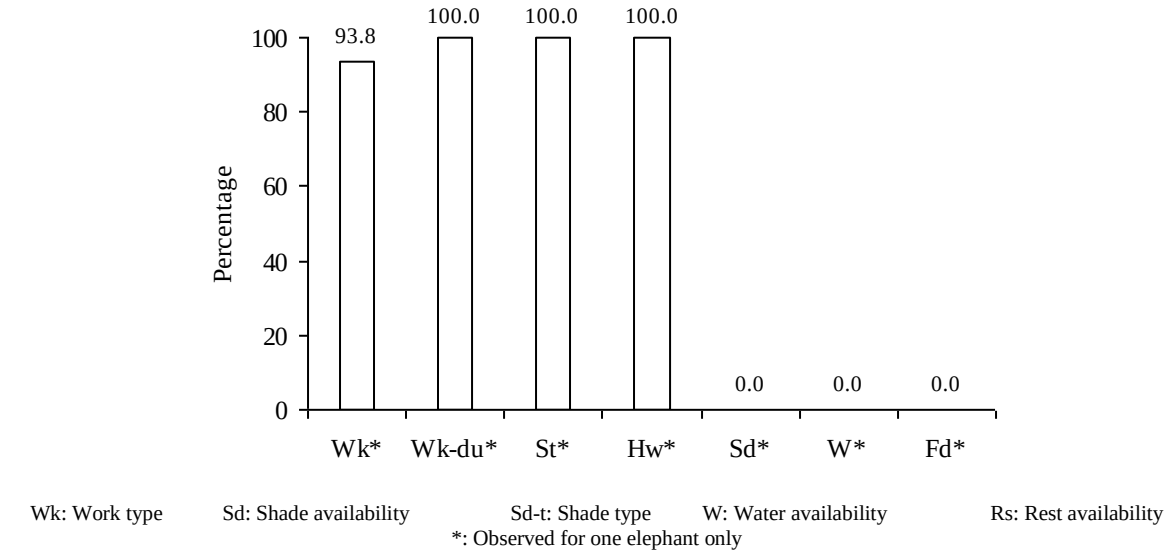


Figure 12: Percentage wise deviation from E-R for 'work' sub-parameters

Food

Elephants have been observed to feed on a wide variety of plants (McKay, 1973; Sukumar, 1991), ways of manipulation of food being learnt in a social context. Stall feed will not be able to provide the same variety. In captivity, as food is provided by people, managerial aspect such as ration chart usage has also been considered.

- All the elephants were given only stall feed
- Food provided was: *Caryota* sp., coconut/ coconut leaves (*Cocos nucifera*), occassionally grass and concentrate food consisting of a mixture of horse gram (*Macrotyloma uniflorum*), rice (*Oryza* sp.) or wheat (*Triticum aestivum*), ragi (*Eleusine coracana*), salt and mineral mixture
- Ration chart was maintained

M-R was 5.1 (SE= 2.2, N*= 4) with a deviation of 43.1% from E-R. Figures 13 and 14 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

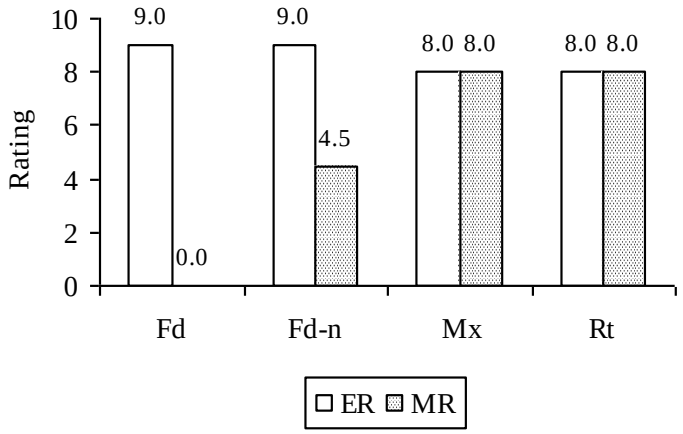
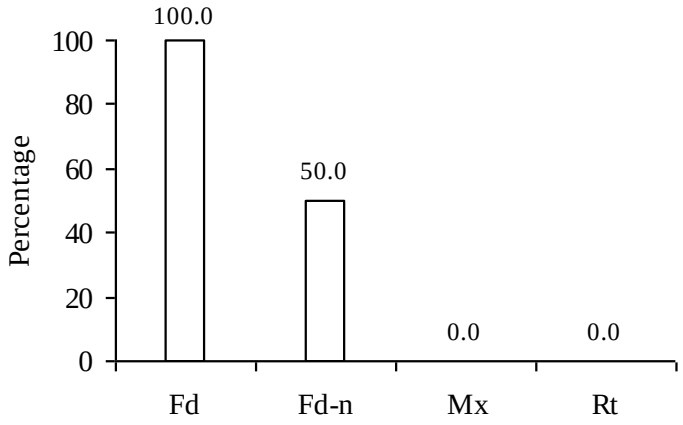


Figure 13: Comparison of E-R and M-R for 'food' sub-parameters



Fd: Food provisioning type Fd-n: Number of stall fed items Mx: Provision of mineral mixture
Rt: Usage of ration chart

Figure 14: Percentage wise deviation from E-R for 'food' sub-parameters

Female reproductive status

The absence of reproductive functioning in adult elephants maybe indicative of underlying poor health or could be associated with stress. The forest camp had only one adult elephant which was a female.

- Oestrus cycles was reported for the adult female
- Mating was reported with a wild male; one calf was born

M-R was 3.6 (SE= 1.9, N*= 4) with a deviation of 54.6% from E-R. Figures 15 and 16 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

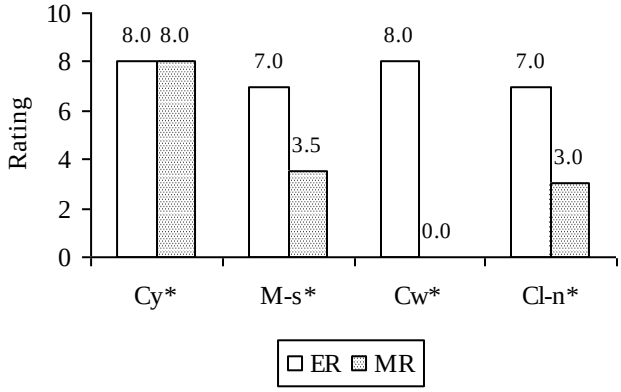
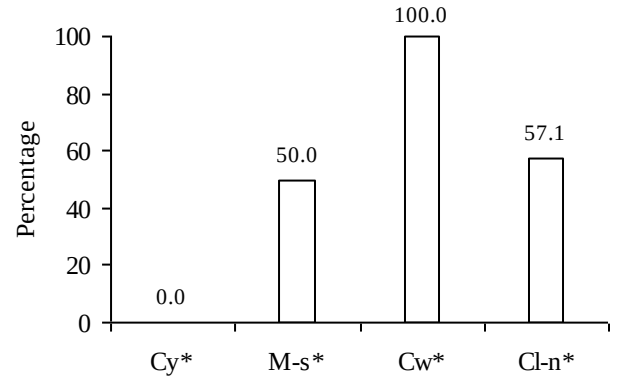


Figure 15: Comparison of E-R and M-R for 'female reproductive status sub-parameters



Cy: Occurrence of oestrus M-S: Male source Cw: Presence of cows during parturition Cl-n: Number of calves born
*: observed for only one elephant

Figure 16: Percentage wise deviation from E-R for female reproductive status sub-parameters

Health status and veterinary protocol

Captivity imposes a set of conditions which may cause health problems such as foot disorders/ abnormal weight, etc (Mikota, 1994). Maintenance of health also involves performing the prescribed veterinary protocol.

- The elephants had incidents of worm infestation, occasional constipation, indigestion and wounds
- All were dewormed, medicated oil was applied once
- Immunization was not done for any of the elephants
- Sample tests of dung was done once in three months, urine/ blood test was done annually

M-R was 5.9 (SE= 1.3, N*= 6) showing a deviation of 26.3% from E-R. Figures 17 and 18 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

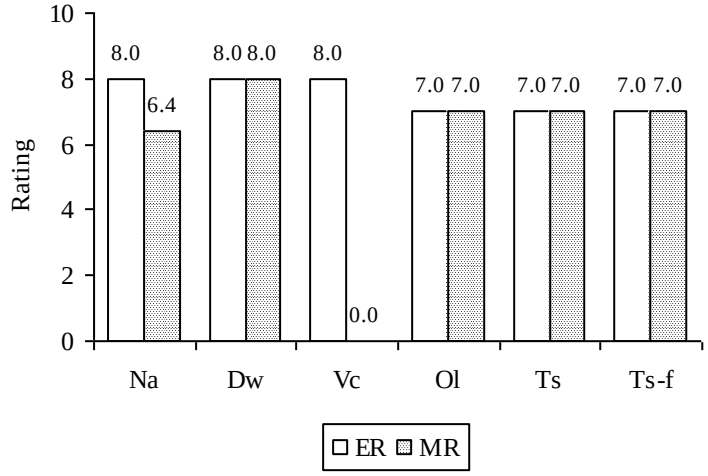
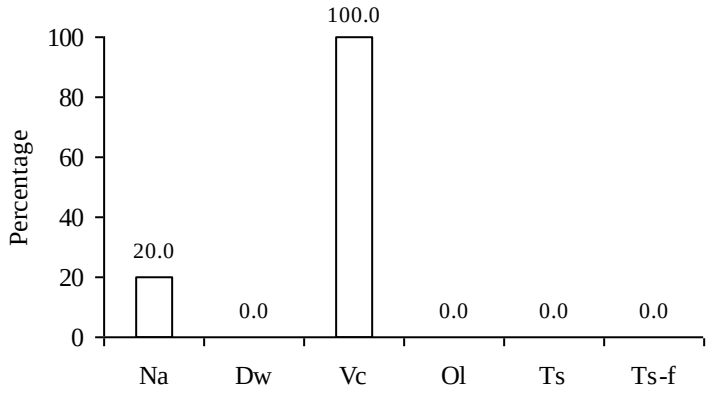


Figure 17: Comparison of E-R and M-R for 'health status' sub-parameters



Na: Nature of disease/ injury Dw: Deworming status Vc: Vaccination status Ol: Oiling status
Ts: Sample tests of dung/ urine/ blood Ts-f: Frequency of sample testing

Figure 18: Percentage wise deviation from E-R for 'health status' sub-parameters

Veterinary personnel and facilities

Availability of veterinary personnel with relevant experience is a significant part of health care. Poor infrastructure can result in badly managed captive conditions for elephants.

- Veterinary doctor was available for all elephants
- Frequency of visits was once in a month
- A veterinary hospital was located close to the camp
- Staff quarters, cooking shed, kraal, camp site, provision shed was available

M- R was 6.3 (SE= 2.2, N*= 3) with a deviation of 29.6% from E-R. Figure 19 and 20 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

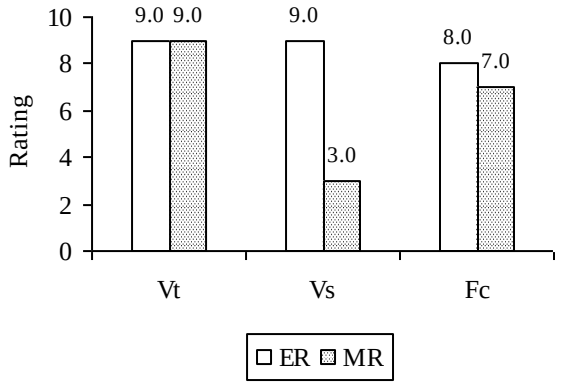
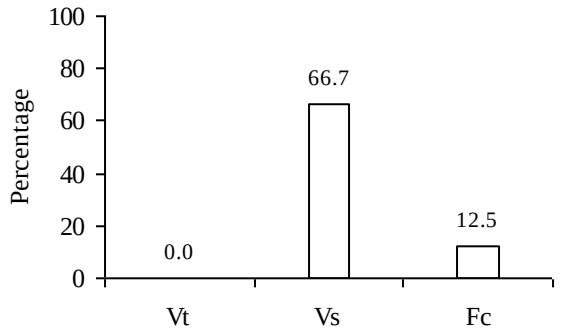


Figure 19: Comparison of E-R and M-R for 'veterinary personnel' sub-parameters



Vt: Availability of veterinary doctor Vs: Frequency of visits Fc: Facilities avialable

Figure 20: Percentage wise deviation from E-R for 'veterinary personnel' sub-parameters

Handler's socio-economic status

The social status in terms of having relatives in this profession and practice of alcohol consumption plays a supplementary role in efficient functioning. Poor/insufficient remuneration may result in poor handling of the elephants.

- Ten handlers were employed for managing five elephants
- The permanently employed mahout had more than 25y experience in this profession; remaining were temporarily employed with > 15y experience
- All handlers had relatives working in this profession
- The permanently employed mahout was given a salary of Rs. 1,20,000/-, others were given Rs. 54,000/- annually
- All handlers were covered by insurance, paid by the Forest Department
- Except one, all handlers consumed alcohol

M-R was 5.8 (SE= 1.4, N*= 5) with a deviation of 27.5% from E-R. Figures 21 and 22 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.

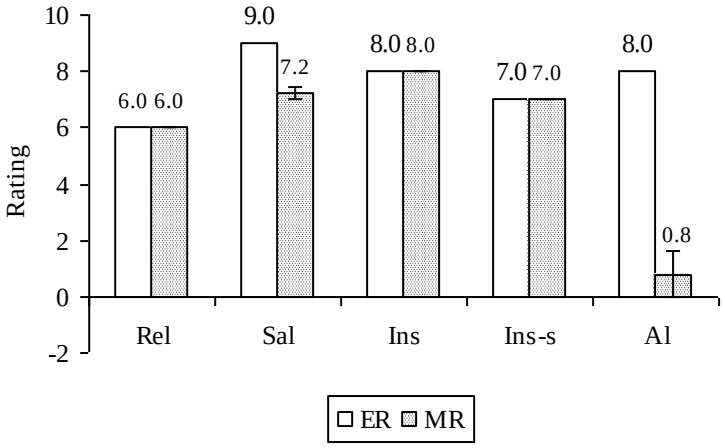
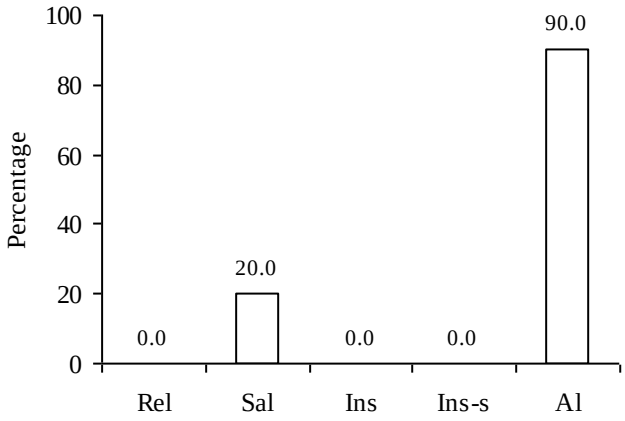


Figure 21: Comparison of E-R and M-R for 'handlers' socio-economic status' sub-parameters



Rel: Relatives in this profession Sal: Salary drawn In: availability of insurance In-s: Source of insurance Al: Consumption of alcohol

Figure 22: Percentage wise deviation from E-R for 'handlers' socio-economic status' sub-parameters

Overall Welfare Status

Overall M-R for elephants, considering all observed parameters together, was 4.5 (SE= 0.5, N*= 54) showing a deviation of 44% from E-R. Figure 23 gives the distribution of Percentage wise deviation from E-R for the observed parameters. 41% of the parameters did not show any deviation from E-R implying occurrence of near ideal features. This was, however, offset by the occurrence of a large percentage (52%, N*= 28) of the parameters accounting for a deviation of 50% or more from E-R implying greater deviation from E-R for more than half the observed parameters.

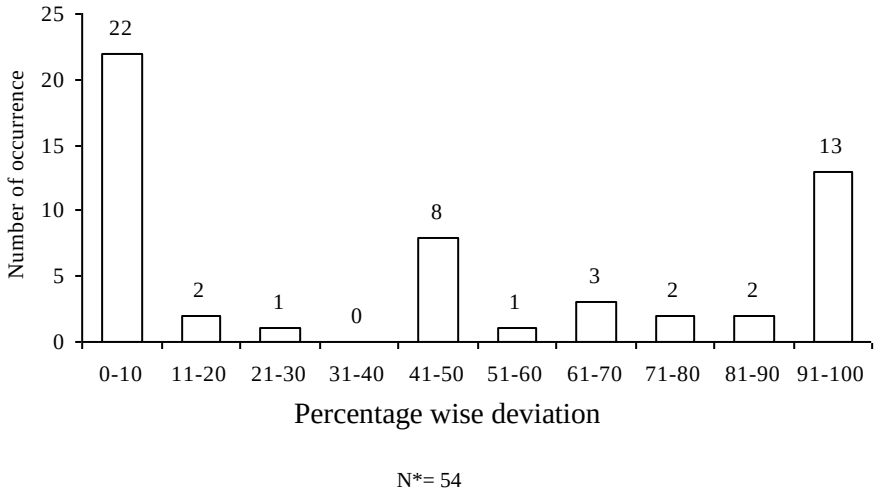


Figure 23: Distribution of Percentage wise deviation from E-R across all observed parameters

Discussion

Maintaining elephants in captivity obligates the provision of features that replicate natural conditions. Absence of natural conditions (biological/ physical) imposes an alien environment on the elephants which may not meet their behavioural and ecological needs.

Parameters which showed 50% or more deviation from E-R:

- The elephants were provided with a natural physical environment in the form of a forest and natural flooring, but were confined to a restricted space as they were all chained for 15h/day
- Chaining restricted their access to water sources, as free range would have provided unlimited provision of water
- Sleeping place and size of the area were constrained to a 1m radius as defined by the chain length
- Provision for social interaction among the elephants was present, but was confined to a two hour duration; when not working or being trained, the elephants were not allowed to free range
- Stereotypic behaviour was observed for three of the rescued calves; Kurt and Garai (2001) report on the occurrence of stereotypies in elephant orphans in Sri Lanka with one of the observed factors being restraining elephants by tying them with ropes.
- None of the elephants was allowed to browse/ graze, all were stall fed; foraging forms a major activity for wild elephants (Sukumar, 1991) feeding a variety of vegetation, providing an opportunity for learning to feed in a social context and also engaging in species-typical activities
- With the exception of immunization, most of the prescribed veterinary care and facilities were provided for all elephants, however, there was no on-site veterinary doctor
- The adult female elephant was sent for festivals as part of its work schedule; this would involve movement away from the camp for the duration of the festival and breakage of any established bonds among the camp elephants

- The adult female elephant was 38y and had calved only once during this period showing a deviation from that observed for similarly aged wild elephants.

Handlers' status

The overall socio-economic status, based on available information, seemed to deviate by less than 30% from E-R. One notable fact was the presence of relatives in the same profession, implying a traditional basis for this profession. The practice of alcohol consumption, however, was almost universal.

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Section 3:
Elephants in Zoos

Executive summary

The zoo in Trivandrum, covering 50 acres, was established in mid-19th century. It has a number of exotic/indigenous species, including a single female Asian elephant*.

This investigation aims to assess the welfare status of this elephant. The welfare status of captive elephants has been assessed by comparing physical/ physiological/ social and psychological features in captivity with those observed in the wild. Deviation from conditions in the wild state for the parameters observed was rated using a scale developed by elephant experts.

The elephant was caught from the wild by the Forest Department and handed over to the zoo in 1943. Mean Rating (M-R) was 0.0 showing a deviation of 100% from Expert Rating (E-R).

The elephant was maintained in unnatural conditions for the purpose of display to the public as a means of education. M-R was 1.0 with a deviation of 87.5% from E-R.

Two kinds of enclosures were available, a day shelter with earthen flooring and a night shelter with concrete flooring. M-R was 3.9 implying a deviation of 51.3% from E-R.

Tap water was available for drinking, with the elephant consuming water twice at 10 a.m. and 4 p.m. Bath duration was 2hrs and scrub material was coconut husk. M-R was 2.9 with a deviation of 58.5% from E-R.

The elephant was taken for a walk on tarred roads once a week for 30 minutes, covering a distance of 4 km and a mahout accompanied the elephant. M-R was 3.0 showing a deviation of 66.7% from E-R.

The elephant was kept singly with no access to companions. M-R was 0.0 indicating complete divergence from E-R.

The elephant was chained with a plain type chain weighing 8 kg, a length of 7 ft and a size of 5 inches. Chaining duration was 16 hrs in open (day) enclosure and around 6 hrs at night; hobbles were used for the fore-legs while in the day enclosure. M-R was 0.8 with a deviation of 90% from E-R.

The elephant was not given any kind of work; hence, M-R was 8.0, indicating no deviation from E-R.

The elephant was stall fed, food being provided in the day and night enclosure. Food given was banana (*Musa* sp.)-500 gm, Palm (*Borassus sp*)-15, Fodder grass-50 kg, *Caryota* palm leaves-11 kg, Plantains (*Musa* sp.)–100gm, coconut (*Cocos nucifera*) palm-105 kg and

* At the time this report was written, the zoo had a single elephant; a male was later brought in from the Mumbai zoo

Asafoetida-100 gm, Jaggery-2 kg, sugarcane-4-5 kg was also given. M-R was 3.0 with a deviation of 66.7% from E-R.
The elephant was given opportunity to breed, though not in the past 5 years. Present age may be beyond the period for occurrence of oestrus cycles. M-R was 7.0 for this sub-parameter.

The elephant seemed to have corneal opacity and lumps were seen on both forelegs. De-worming was practiced, but immunization and oiling was not done, and the M-R was 2.2 implying a deviation of 72.2% from E-R.

Veterinary doctor was available for the elephant, checking on the elephant daily. The zoo hospital was equipped with a laboratory, out-patient facility and the health record of elephant and service record of handlers was maintained. M-R was 7.5 with a deviation of 16.7% from E-R.

The welfare assessment of the elephant in the zoo revealed an overall mean rating of 3.4 implying an overall deviation of 57.5% from E-R. This means, on an average, nearly 60% deviation from norms considered suitable by experts can be seen in the observed parameters on an average.

Thirty one (of a total of 47) parameters showed deviations of 50% or more, constituting 66% of all deviations. More than half of the observed parameters deviated by more than 50% from the standards considered suitable by experts.

Introduction

The zoo in Trivandrum, covering 50 acres, was established in mid-19th century. It has a number of exotic/indigenous species, including a single female Asian elephant. Captive conditions for elephants vary between institutions, with some providing natural conditions and others housing the animals in man-made enclosures with no natural conditions.

Objective

This report aims to assess the welfare status of this lone elephant:

- In terms of provisions made to meet the physical and biological needs of elephant.

Method

Bradshaw (2009) reports of welfare studies that are based on the difference between a captive environment and those observed in the wild. The welfare status of captive elephants has been assessed by comparing physical/ physiological/ social and psychological features in captivity with those observed in the wild. Deviations from conditions in the wild have been considered to represent poor welfare. The greater the deviation, the poorer the welfare. Deviation from the wild state for the parameters observed was rated using a scale developed by elephant experts. Data was collected through observations of elephants/ interviews with relevant personnel.

Data Processing

The rating method

A team of 31 experts including elephant biologists, veterinary doctors (studying wildlife disease and captive elephant disease), welfare personnel (working on wildlife conservation and welfare issues), wildlife managers (managing wild, captive elephants) and elephant mahouts rated different parameters of importance to the welfare of captive elephants (Varma, 2008; Varma, et al., 2008; Varma and Prasad, 2008). This rating was then used to assess the welfare status of elephants and elephant keepers:

- Experts rated a total of 114 welfare parameters covering all the major aspects of captivity
- The rating scale was from zero (unsuitable conditions) to ten (suitable conditions). With this logic, experts used maxima based on their concept of the importance of a particular parameter to an elephant. For example mean expert rating of 8.0 (SE= 0.5, N=29) for a parameter 'floor' and 9.0 (SE=0.4, N=31) for 'source of water' was arrived at from the ratings suggested by each expert
- A mean rating for each parameter, across all the participating experts, has been used as the Experts' Rating (E-R) which represents the importance attached to a parameter.
- For example, if an elephant is exposed only to natural flooring, the animal receives a rating of 8 and for entirely unnatural flooring the value is 0; if animal is exposed to both natural and unnatural flooring, the value is 4 (as 8+0/2= 8/2= 4). If an elephant is exposed to a natural water source, such as a river, it receives a value of 9; if the source of water is large lakes or reservoirs, it gets 4.5. A value of 3.5 is assigned for small water bodies like tanks and ponds. Tap water (running) gets 2.5 and if only buckets, pots, and tankers are in use, then the allocated value is 0.5.

- Data for an elephant or a group of animals was collected. With this data Mean Rating (M-R) was calculated for a given parameter, along with its sub-parameters. Thus the Mean Rating (M-R) denotes welfare status of existing conditions on the ground for the particular parameter.
- In this investigation, variables which represent a common feature of the captive situation has been grouped to form a parameter. The variables have been termed sub-parameters. For example, the variables shelter type, shelter size, floor type in the shelter; all represent different aspects of the physical space provided to the elephant. Hence, they are grouped together to form the parameter "Shelter" and each constituent variable is a sub-parameter. In this investigation, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters. M-R is also based on similar lines.
- E-R and M-R for each of the zoos here represent the average across related parameters observed for that zoo. For instance, E-R / M-R for a parameter "shelter" represent the average of related parameters (termed sub-parameters) such as type, flooring, size, and shade availability. Not all related parameters will be rated for each of the zoos. The number of such related parameters varies for each zoo.
- Results have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the parameters observed. The difference between E-R and M-R (expressed as percentage) indicates deviation from the prescribed norm.
- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) has been used to indicate the professional/ socio-economic status, of value to the handler and his elephant.
- N* refers to number of sub-parameters for an observed parameter.

Results
The zoo maintained a single female Asian elephant, Maheshwari, aged more than 70yrs.

Source
Elephants caught from the wild experience greater change in captivity, implying greater stress, than those which are captive born. Hence, such animals have been assigned low rating.

- The elephant was caught from the wild by the Forest Department and handed over to the zoo in 1943.

M-R was 0.0 showing a deviation of 100% from E-R.

Purpose
- The elephant was maintained in unnatural conditions (both in terms of physical space as well opportunity to express species-typical behaviours) for the purpose of display to the public as a means of education.

M-R was 1.0 with a deviation of 87.5% from E-R.

Shelter

Wild elephants traverse vast distances in search of food, water/ mates (Poole and Granli, 2009) with a home-range size of 100-300 sq km, depending on availability of food/water (Sukumar, 1989). The absence of sufficient space and/or suitable substrate in captivity may result in insufficient exercise (physical/ psychological), poor foot health.

- Two kinds of enclosures were available, a day shelter with earthen flooring and a night shelter with concrete flooring
- Total enclosure size was 2050 sq.m. Size used by elephant was 40 sq.m
- Partial tree cover was available in the day shelter and the night enclosure was a roofed permanent shelter

M-R was 3.9 (SE= 1.7, N= 7) implying a deviation of 51.3% from E-R.

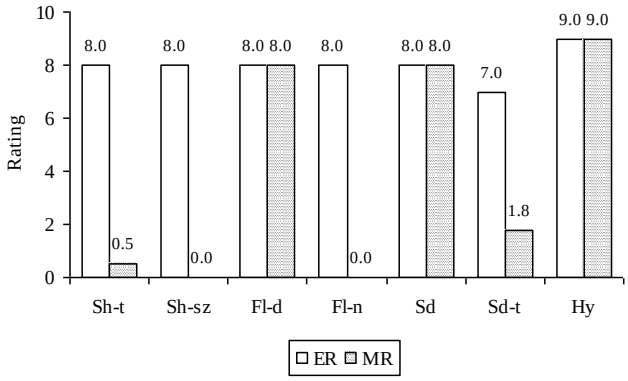
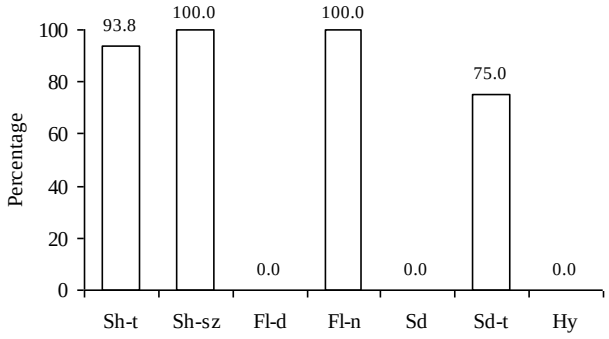


Figure 1: Comparison of E-R and M-R for 'shelter' sub-parameters



Sh-t: Shelter type Sh-sz: Shelter size Fl-d: Flooring (day) Fl-n: Flooring (night) Sd: Shade availability Sd-t: Shade type Hy: Hygiene maintenance

Figure 2: Percentage wise deviation from E-R for 'shelter' sub-parameters

Water

Wild elephants have been observed to include water sources in their home-range, engaging in dust-bathing/ wallowing and socializing (McKay, 1973). Accessibility to water may be limited for captive elephants depending on the source and also opportunity for species-typical activities may be restricted.

- Tap water was available for drinking, with the elephant consuming water twice at 10 a.m. and 4 p.m.
- No quality tests were done on the water
- A pool of 20 litre. capacity was available in the night enclosure
- Scrub bath was given once in 2 days, otherwise animal was hosed down in the evening before being housed in the enclosure for the night
- Bath duration was 2 hrs and scrub material was coconut husk

M-R was 2.9 (SE= 1.1, N = 6) with a deviation of 58.5% from E-R.

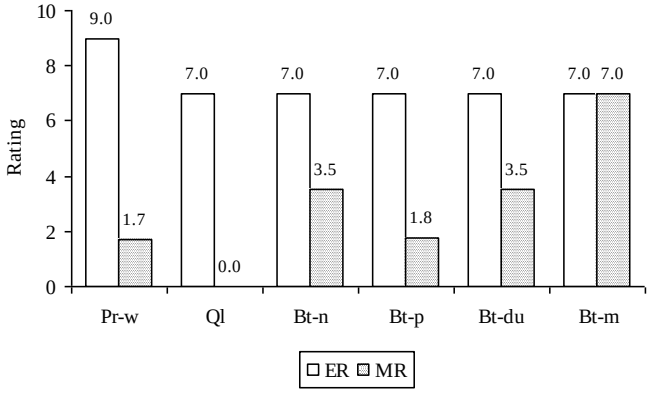
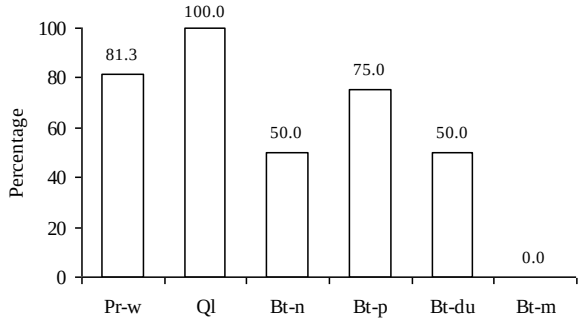


Figure 3: Comparison of E-R and M-R for 'water' sub-parameters



Pr-w: Availability of perennial source of running water Ql: water quality tests
Bt-n: Number of times bathed Bt-p: Bathing place Bt-du: Bath duration
Bt-m: Bathing materials

Figure 4: Percentage wise deviation from E-R for 'water' sub-parameters

Sleep

Occurrence of suitable substrates while sleeping, provision of sufficient space and appropriate duration of sleep can be considered to be positive indicators of welfare.

- The night enclosure had concrete flooring
- Sleep area/ size was only 40 sq.m
- Sleeping duration was 6-7 hrs

M-R was 1.5 (SE= 1.5, N = 3) with a deviation of 81.3% from E-R.

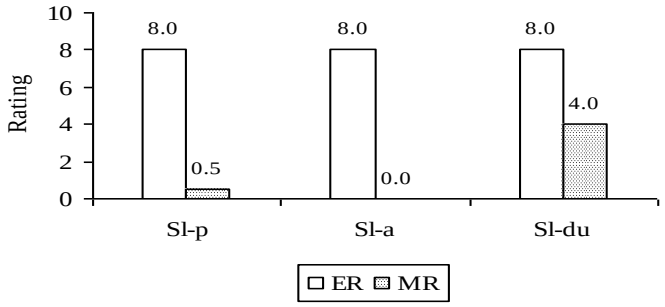
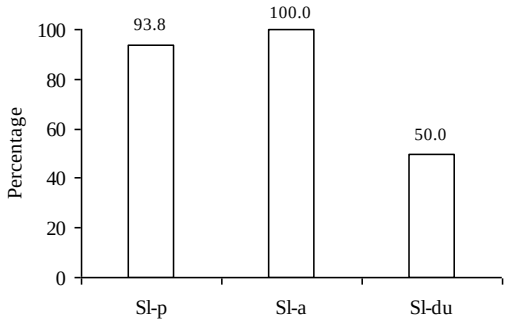


Figure 5: Comparison of E-R and M-R for 'sleep' sub-parameters



Sl-p: Sleeping place Sl-a: Sleep area Sl-du: Sleep duration

Figure 6: Percentage wise deviation from E-R for 'sleep' sub-parameters

Walk

Wild elephants are known for ability to cover vast distances across days of travel (Poole and Granli, 2009). Lack of opportunity to walk and no other "occupation" for a captive elephant may have psychological consequences.

- The elephant was taken for a walk on tarred roads once a week for 30 minutes, covering a distance of 4 km
- A mahout accompanied the elephant

M-R was 3.0 (SE= 2.4, N = 4) showing a deviation of 66.7% from E-R.

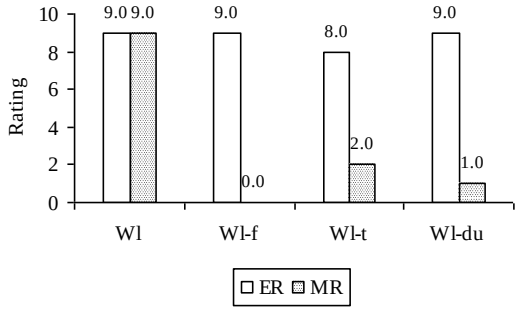
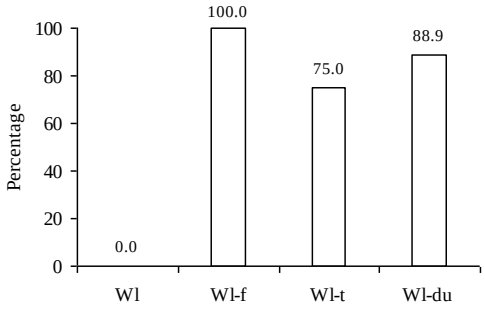


Figure 7: Comparison of E-R and M-R for 'walk' sub-parameters



Wl: Opportunity to walk Wl-f: Frequency of walks
Wl-t: time of walk Wl-du: Walking duration

Figure 8: Percentage wise deviation from E-R for 'walk' sub-parameters

Social interaction

Social interaction among herd related members is integral to elephant society, especially females (Sukumar, 2006).

- The elephant was kept singly with no access to companions

M-R was 0.0 indicating complete divergence from E-R.

Chaining

Restriction of movement can be physically damaging as lack of exercise may result in obesity and also chafing of the chain against the skin may result in wounds/ injuries/ foot-pad diseases.

- The elephant was chained with a plain type chain weighing 8 kg, a length of 7ft and a size of 5 inches.
- Chaining duration was 16 hrs in open (day) enclosure and around 6 hrs at night; hobbles were used for the fore-legs while in the day enclosure
- No opportunity to free range.

M-R was 0.8 (SE= 0.9, N = 5) with a deviation of 90% from E-R.

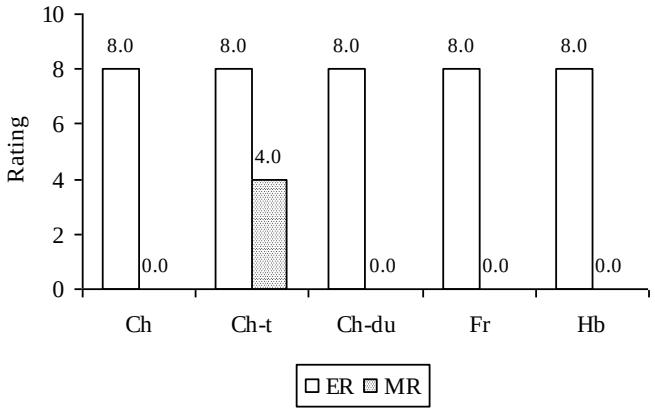
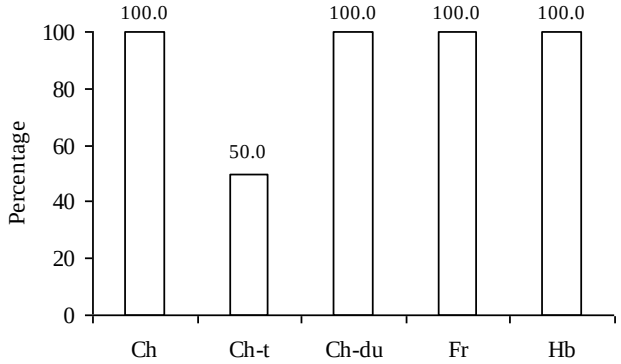


Figure 9: Comparison of E-R and M-R for 'chaining' sub-parameters



Ch: Chaining status Ch-t: Chain type
Ch-du: Chaining duration Fr: Opportunity to free-range
Hb: Use of hobbles (shackling)

Figure 10: Percentage wise deviation from E-R for 'chaining' sub-parameters

Observed behaviour

Elephants which are aggressive and difficult to handle may pose a problem for the management in the way the animal is cared for. Occurrence of stereotypy is an indicator of an underlying cause related to poor welfare.

- The elephant was described as quiet
- The animal was said to be rough towards strangers and new handlers; the animal was aggressively throwing objects at people if the mahout was not around
- No incidents of killing/ injuring people
- No stereotypy was observed

M-R was 7.7 (SE= 1.1, N = 3) with a deviation 4.2% from E-R.

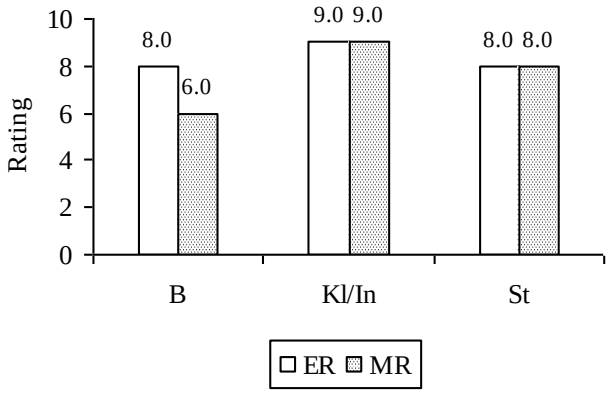


Figure 11: Comparison of E-R and M-R for 'behaviour' sub-parameters

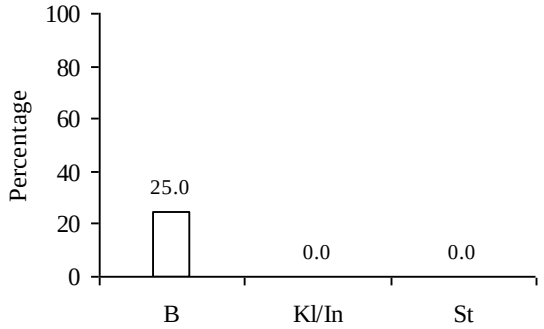


Figure 12: Percentage wise deviation from E-R for 'behaviour' sub-parameters

Work

The elephant was not given any kind of work; hence, M-R was 8.0, indicating no deviation from E-R.

Food provisioning

Wild elephants spend a major part of their activity in foraging (Sukumar, 1991), eating a wide variety of plants. This activity also involves manipulating the food before eating, socialising, providing an opportunity for other herd members to learn. None of this can be seen in captivity for elephants that are stall fed.

- The elephant was stall fed, food being provided in the day and night enclosure
- Food given was banana (*Musa* sp.)–500gms, Palm (Borassus sp.)-15, Fodder grass–50 kg, Caryota palm–11 Kg, Plantains (*Musa* sp.)–100gms, coconut (*Cocos nucifera*) palm–105 kg
- Asafoetida-100 gm, jaggery (sweet derived from sugarcane – *Sacharum sp*) –2 kg, sugarcane-4-5 kg was also given

- No mineral mix was given
- Ration chart was used

M-R was 3.0 (SE= 2.2, N= 4) with a deviation of 66.7% from E-R.

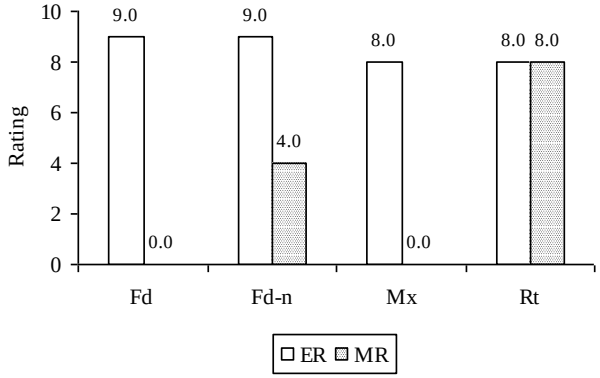
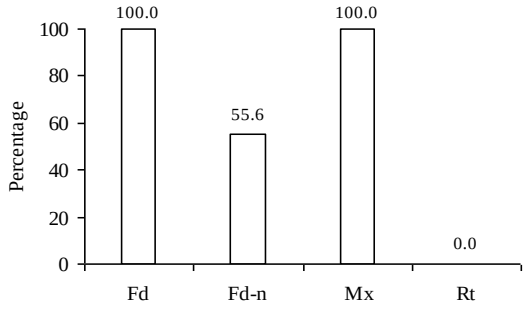


Figure 13: Comparison of E-R and M-R for 'food' sub-parameters



Fd: Food provisioning Fd-n: Number of food items Mx: Mineral mix given
Rt: Usage of ration chart

Figure 14: Percentage wise deviation from E-R for 'food' sub-parameters

Reproductive status

The elephant was given opportunity to breed, though not in the past five years. Present age may be beyond the period of the occurrence of oestrus cycles.

M-R was 7.0 for this sub-parameter, indicating no deviation from E-R.

Health status

Captivity predisposes elephants to certain diseases/ injuries as a consequence of their proximity to people or living conditions. Thus, adherence to prescribed veterinary schedules has been rated.

- The elephant seemed to have corneal opacity
- Lumps were seen on both forelegs

- De-worming was practiced, but immunisation and oiling was not done
- Samples of blood/dung/urine were tested once
- Body measurements were not taken

M-R was 2.2 (SE= 1.5, N= 6) implying a deviation of 72.2% from E-R.

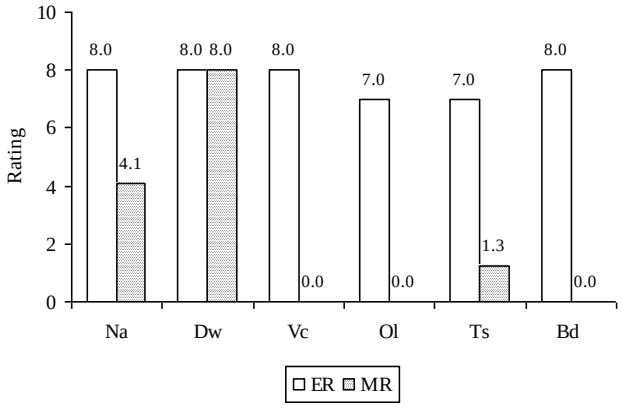
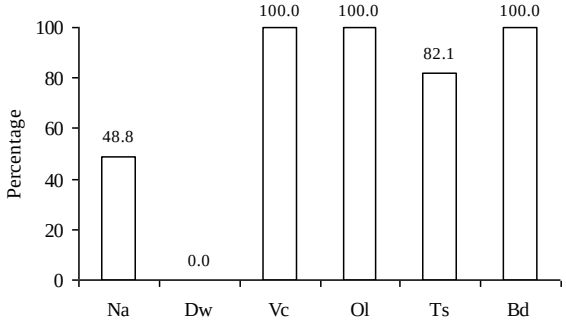


Figure 15: Comparison of E-R and M-R for 'health' sub-parameters



Na: Nature of disease/ injury Dw: Deworming status
Vc: Vaccination status Ol: Oiling done
Ts: Sample tests Bd: Body measurements

Figure 16: Percentage wise deviation from E-R for 'health' sub-parameters

Veterinary personnel and facilities

Provision for veterinary personnel with relevant experience is important in maintaining health of the elephants. Inadequate infrastructure may add to the deficiency in providing appropriate care.

- Veterinary doctor was available for the elephant, checking the elephant daily
- The zoo hospital was equipped with a laboratory, out-patient facility
- Other facilities/ infrastructure included: staff quarters, provision/ cooking shed, camp site
- Health record of elephant and service record of handlers was maintained

M-R was 7.5 (SE= 1.4, N = 4) with a deviation of 16.7% from E-R.

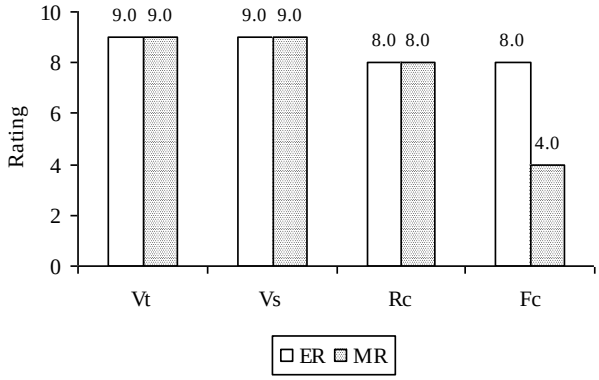
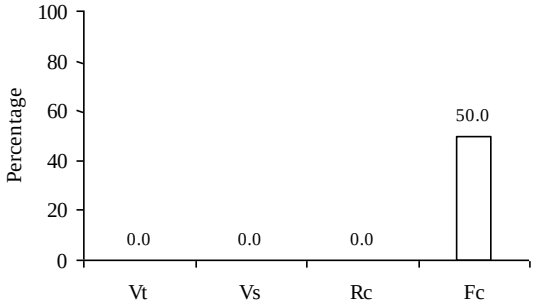


Figure 17: Comparison of E-R and M-R for 'veterinary personnel and facilities' sub-parameters



Vt: Availability of veterinary doctor Vs: Frequency of visits Rc: Maintenance of records
Fc: Facilities available

Figure 18: Percentage wise deviation from E-R for 'veterinary personnel and facilities' sub-parameters

Figure-19 gives the distribution of deviation (from E-R) across all observed parameters. It can be seen that 31 (of a total of 47) parameters showed deviations of 50% or more, constituting 66% of all the deviations. More than half of the observed parameters deviated by more than 50% from the standards considered suitable by experts.

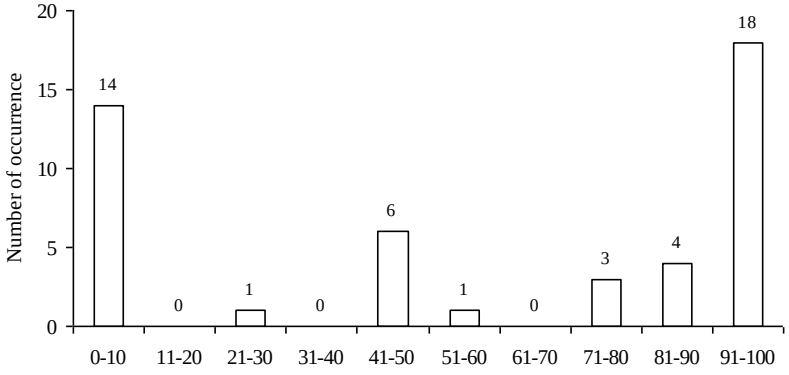


Figure 19: Distribution of deviation values across all parameters

Overall ratings

The welfare assessment of the elephant in the zoo revealed an overall mean rating of 3.4 (SE= 0.5, N = 47) implying an overall deviation of 57.5% from E-R. This means, on an average, nearly 60% deviation from norms considered suitable by experts can be seen in the observed parameters.

Discussion

The needs of elephants can be assessed based on the knowledge gained from studies on wild elephants. The ecological and biological needs can be incorporated to provide a relatively suitable environment for captive elephants.

Parameters with less than 10% deviation from E-R:

- Absence of stereotypic behaviour, no incidents of killing/ injury— though the elephant was described as quiet, she showed signs of being rough towards strangers. Significantly, the elephant seemed to be attached to her mahout, expressing rough behaviour when the mahout was not around.
- Some aspects of veterinary care such as de-worming, record maintenance, presence of veterinary doctor and clinic facilities were acceptable.

Parameters deviating from E-R:

Deviations were distributed across all the observed parameters. This implies unsuitability of living conditions even when some features are appropriate.

- Shelter: day flooring was earthen and hence suitable. This was the only suitable feature of the shelter as the elephant was exposed to the sun during the day (due to partial shade availability and restriction on movement). Night shelter was confined to an enclosed area with concrete flooring
- Water was not accessible to the elephant when it needed to drink or bathe. Bathing was done in the evening with only occasional scrubbing
- Walking was on hard surface and of limited duration and frequency, exercise was insufficient
- There was no social interaction but as it was a single elephant, the animal seemed to have formed a bond with the mahout
- The elephant was chained for most parts of the day
- No opportunity to graze/ browse, only stall feed

The absence of features integral to a species' biological needs was characteristic of this elephant's living condtions. Wild elephants are known to be social, especially females, traversing kilometers in groups in search food/ water/ companions. The duration spent in standing still in one place in very low (Poole and Granli, 2009); its opposite was true for this elephant with the animal being chained for at least 20hrs and taken for a walk occasionally. Psychological stimulation was absent as there was no work, no free movement, no chance for interaction. The period for which this elephant has been in this condition is not known as previous history was not collected. Irrespective of its history, there can be no doubt that the present conditions are primarily unsuitable for the elephant. In addition, the maintenance of the elephant by the zoo in its current form gives a wrong impression to the public about the

biology/ behavioural ecology of a species. It is contrary to its stated aim of trying to educate the public.

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Section 4:
Captive Elephants in Temples

Executive summary

Elephants are currently being maintained in captivity for various reasons— religious significance, as a status symbol, etc. Of the captive elephant population, nearly 50% may belong to religious institutions. This population of captive elephants is subject to differing management and keeping conditions with negative consequences on the well-being of the animal.

The welfare status of elephants in temples of Kerala was assessed based on a rating scale. The rating scale from unsuitable conditions to suitable conditions was used to assess the welfare status of captive elephants and their handlers.

The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter, defined as Experts' Rating (E-R). Mean Rating (M-R) representing the actual situation existing for the elephant/s was obtained through the ground survey. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.

Two categories of temples were samples; category one, irrespective of the number of elephants maintained, each temple has been considered individually. Thus, the sample size will be N = 21. The category two; all the elephants, irrespective of their ownership to a temple have been considered together. Thus the sample size will be N^a = 87. The reason for this procedure is due to the unequal distribution of elephants among the temples observed.

Male elephants outnumbered females (Male: Female: 6.7:1.0). The number of elephants maintained ranged from 1- 60. All the observed elephants had undergone change in ownership as a result of being purchased/ transferred/ having been donated to different temples. Guruvayoor elephants were all donated by devotees. M-R was 1.5.

All temples had an open shelter. Mean area (inclusive of other elephants in each temple) was 0.037 Km^2. Guruvayoor elephants had a mean area of 0.07Km^2. Mean area for each elephant (area where the elephant is tied/ kept) was 0.000032 Km^2 spending between 10 – 24 hrs a day within. M-R was 4.0 indicating a deviation of 50% from E-R

All the temples had access to water: most common source was well, followed by rivers, taps and ponds; in terms of temples: 45% used wells as water source, ponds were seen in 15% of the temples; 12 temples had more than one source of water. Distance to water source varied 3.3-102.8m (well), 25-5500m (river), 3.3-33.3m (tap) and 3.3- 91.4m (ponds). Bath frequency varied from daily to fortnightly with the bathing place being the tethering site, pond or river. Bath duration varied from 2-5h (considering all elephants together). M-R was 4 indicating a deviation of 50.3% from E-R.

In terms of number of temples, 76% did not provide for social interaction during off-season. Only 5% of elephants did not have provision for interaction while working. Duration ranged from 1-2 hrs to 20-24 hrs during off-season and the group size ranged from 1 (off-season) to 1-20 (working). M-R was 4.5 indicating a deviation of 44% from E-R.

All elephants were chained in more than one region: leg-neck/ leg-body/ leg-body-hobbles. Chaining duration depended on whether the elephants were working or not: off-season duration ranged from 18-22 hrs (all elephants); while working, this duration ranged from 2-3 to 10-15 hrs. Fifty four percent of all elephants were shackled using hobbles. None of the elephants were allowed to free range at any time of the day. M-R was 1.2 indicating a deviation of 85% from E-R.

Sixty three percent of all elephants were described as quiet/ reliable and 27% were described as undependable/ agitated/ nervous. Forty eight percent of the elephants had injured/ killed public/ handlers. Fifty six percent of all elephants exhibited stereotypic behaviour such as body/ head swaying/ trunk biting, most were described as being of medium intensity. M-R was 4 indicating a deviation of 47% from E-R

All elephants were given only stall feed and the feeding place was the enclosure/ shelter (off-season) or any wayside place/ temporary camp-site while working. Food items given were: Coconut (*Cocos nucifera*) branches, Banana fruits/ plantain (*Musa* sp.) trunk, water melon (*Citrullus vulgaris*), rice (*Oryza* sp.), rice flakes, rice and turmeric (*Curcuma longa*), sugarcane (*Saccharum* sp.), Palm leaves (Family Arecaceae), *Caryota* palms; for Guruvayoor elephants: Rice, rice flakes, Banana, Green grass, Horse-gram (*Macrotyloma uniflorum*), Green-gram (*Vigna radiata*), Stem of plantain (banana) tree, dates (*Phoenix dactylifera*), Cucumber (*Cucumis sativus*), Watermelon, rice and turmeric (all the items listed were not given together). M-R was 2 showing a deviation of 78% from E-R

Only 10% temples were not using elephants for work. All the observed elephants were used for festivals/ temple rituals/ processions/ parades such as: "*Parayadi/ Paraeduppu, Aarattu, Ezhunnallippu and Procession (siveli), Vilakku-pooramu*". Work duration ranged from 6-12 hrs— morning and night, 4 hrs (off-season).

Work period was during the festival season: with the elephants attending between 40-100 programs/ season located at a distance of 35-150 km, generating an income of Rs.1000-5000/festival. Mean duration an elephant was made to stand per festival was 3.9 hrs (day) and 3.5 hrs (night). The duration ranged from 1.5-5.5 hr (day) and 1.5-6.0 hrs (night). M-R was 3.0 (SE= 1.3, N*= 9) indicating a deviation of 63% from E-R

Data available for 2 female elephants suggests that both were exposed to males during festivals but were not given opportunity to breed. Except for one elephant (a 58y old male), musth reported for all males. Musth males were isolated/ watered/chained for the duration. Males in musth were reported to be aggressive towards handlers/ strangers. Post musth problems were seen through loss of body condition/ chain wounds caused by absrasion. M-R was 2 indicating a difference of 73% from E-R

Occurrence of wheezing, foot-rot, oozing of pus from trunk, colic, loss of vision and abrasion marks on legs were reported for the elephants. M-R was 3 indicating a deviation of 59% from E-R

All temples had access to a veterinary doctor with varied experience with elephants. Most doctors were on call or visited monthly, with one temple reporting daily visits by the doctor. Except two, all temples maintained records relating to health/ service/ clinic. M-R was 6 showing a deviation of 31% from E-R

Mean number of years of experience for elephant handlers in this profession was 14 yrs, ranging from 2-38 yrs. Thirty four percent of handlers were not trained, and 10% handlers' knowledge of commands was described as average, the rest were said to be good. M-R was 6 indicating a difference of 35% from E-R

Seventy percent of handlers had relatives in the same profession. Mean annual salary was Rs. 50,954/- ranging from Rs. 36,000/- to 84,000/-. 76% of handlers were said to consume alcohol, all after work hours. M-R was 5 with a deviation of 36% from E-R

Overall M-R was 3.3 showing a deviation of 59% from overall E-R implying, on an average, a difference of 60% would be noticed. Most occurrences were seen for maximum deviation (91-100%) from E-R.

Fifty five percent of the parameters showed a deviation of 50% or more from E-R implying absence of suitable features to this extent for more than half of the observed parameters. These parameters were spread across all the observed features: shelter/ water/ chaining/ physical exercise (walk)/ feeding/ work/ behaviour/ reproductive status and veterinary care.

Introduction

The practice of keeping elephants by temples may have begun as a suitable place to keep war elephants in between battles (Ghosh, 2005). Elephants owned and maintained by temples have outgrown this practice or the converse, i.e., using temple elephants in battles has also ceased; historically, the affluent of this region owned several elephants as a sign of prosperity. Unable to meet the rising cost of maintaining elephants, some of these animals were given to temples. Elephants are currently being maintained for various reasons—religious significance, as a status symbol, etc. This population of captive elephants is subject to differing management and living conditions with consequences on the well-being of the animal. Of the captive elephant population in Kerala, nearly 50% may belong to temples (Lair, 1997, citing Santiapillai).

Objective

Elephants and their handlers (mahouts/ cawadis) belonging to twenty-one temples in the state of Kerala were observed and data collected to:

- Assess the welfare status of elephants in temples in terms of the physical, social, physiological, psychological and health related features
- Assess the professional experience and socio-economic status of elephant handlers

Method

The association between elephants and people dates back several thousand years (Lair, 1997) but this contact has not resulted in domestication of elephants as the species has not been selectively bred in captivity, with new animals being caught from the wild. With this perspective, the welfare of captive elephants has been gauged by the deviation the animal experiences in its living conditions (physical and biological) in captivity. The greater the divergence from the wild, the lesser is the welfare.

Deviation from wild living conditions has been considered by assessing different features of captivity: physical space, social opportunities, opportunities for performance of species-typical behaviours, normal reproductive functioning among adults. Also, infrastructural features related to veterinary care availability have been considered as captive elephants may develop diseases/ disorders or may suffer from injuries/ wounds. Each of these aspects of captivity has been rated for its suitability to elephants.

The rating method

A team of experts, from wildlife biologists to welfare activists, rated different parameters of importance to the welfare of captive elephants (Varma and Prasad, 2008). This rating was then used to assess the welfare status of elephants and mahouts/ cawadis.

- Experts from different fields rated a total of 114 welfare parameters covering all the major aspects of captivity
- The rating scale was from zero (unsuitable conditions) to ten (suitable conditions). Experts used different maxima based on their concept of importance of a particular parameter to an elephant. A mean rating for each parameter, across all the participating experts, has been used as the Experts' Rating (E-R) which represents the

importance attached to a parameter i.e., for a parameter with 8.0 as the maximum value, only 2.0 (25%) deviation from the prescribed norm is considered acceptable.

- Using the maxima given by experts as a base, a rating scale, starting from zero to the particular maximum value for that parameter, has been used to rate the welfare status. This forms the Mean rating (M-R) denoting welfare status of existing conditions for the particular parameter.
- The experts rated 114 different parameters. In this report, variables which represent a common feature of the captive living conditions have been grouped to form a parameter. The variables have been termed sub-parameters. For example: the variables, shelter type, shelter size, floor type in the shelter, represent different aspects of the physical space provided to the elephant. Hence these are grouped together to form the parameter "Shelter" and each constituent variable is a sub-parameter. In this report, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters. Similarly for M-R also.
- Graphs have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the sub-parameters observed. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm. The graphs are based on ratings across temples (independent of number of elephants).
- Graphs depicting Percentage deviation from E-R for each observed parameter (sub-parameter) have been presented. These graphs depict deviation for each sub-parameter across all the temples (independent of number of elephants maintained).

N refers to number of temples observed.
N^a refers to number of elephants observed, across all the temples.
N* refers to number of sub-parameters observed for a parameter.

Result

Twenty-one temples were observed and relevant data was collected through observation and interview of concerned personnel. The results presented in the following pages are of two types:

a. Irrespective of the number of elephants maintained, each temple has been considered individually. Thus, the sample size will be N = 21.
b. All the elephants, irrespective of their temple, have been considered together. Thus the sample size will be $N^a = 87$.

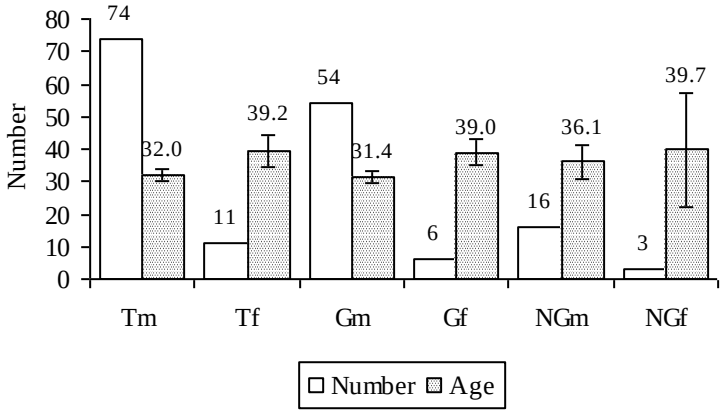
The reason for this procedure is due to the unequal distribution of elephants among the temples observed. Sixty-nine percent (60 in number) of all the elephants observed belong to the Guruvayoor temple. Hence, management and husbandry practices such as shelter/ drinking and bathing provisions/ food/ work type/ veterinary care availability will be influenced by the greater numbers of Guruvayoor elephants. Hence, for such features, individual temples (N = 21) have been considered and data presented. The sample size for Guruvayoor temple for each of the above parameters depended on the uniformity of ratings: when all 60 elephants scored the same for an observed feature, only one rating was taken as representative of the temple. When there were two sets of ratings, say, 5.0 and 4.5, distributed across the 60 elephants, one of each rating was selected.

For features related to intrinsic nature of elephants observed behaviour/ reproductive functioning/ quantity of water consumed/ sleep duration/ nature of disease and injury— the sample size of (N^a = 87), irrespective of ownership to a temple, has been considered. While each of these features may interact with captive conditions and provide a confounding picture, it is the characteristic of the elephant which is interacting with the surrounding conditions. Hence this has been considered the predominant aspect for rating. In addition to these features, chaining has been included in this category as aspects such as region/duration of chaining are dependent on the behaviour of the animal.

Male elephants outnumbered females (M:F; 6.7:1.0), with Guruvayoor temple having a ratio of M:F ; 8.6:1.0. The number of elephants maintained ranged from 1- 60 with a mode = 1.0. Figure 1 shows a predominance of males across all temples observed, irrespective of number of elephants maintained per temple. (The total number of elephants, N^a = 85, age was not known for two female elephants).

Overall age-sex distribution in temples

Figure 1 provides the details of overall distribution of captive elephants in temples that were sampled for the investigation. It is interesting to note that all temples have more males and both the sexes kept in the temple were adults



Tm: Total males Tf: Total females Gm: Guruvayoor males Gf: Guruvayoor females
NGm: Non-Guruvayoor males NGf: Non-Guruvayoor females

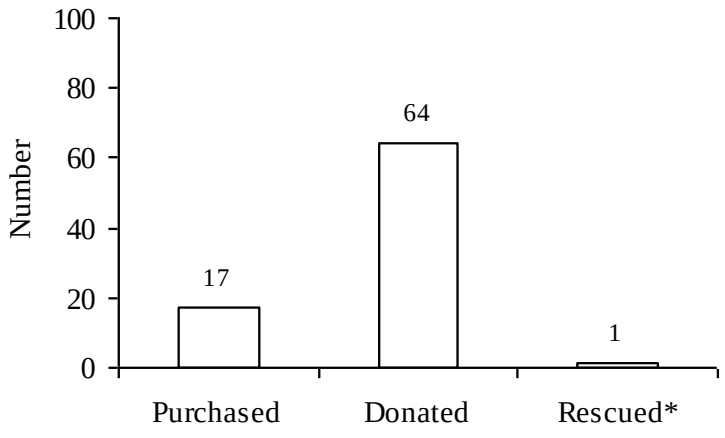
Figure 1: Age-sex distribution of elephants across observed temples

Source of elephant

Change in ownership may cause change in management schedule for the elephant. New locations, unfamiliar handlers, different keeping systems are potential stressors for animals. Kurt and Garai (2007) mention the incidence of stillbirth/ rejection among mothers which were weaned at an early age.

- All the observed elephants had undergone change in ownership as a result of being purchased/ transferred/ having been donated to different temples.
- Guruvayoor elephants were all donated by devotees.

M-R was 1.5 (SE= 0.02, N^a = 82). Figure 2 gives the nature of source elephants.



*: Rescued from a forest around 1936

Figure 2: Source of temple elephants

Shelter

Wild elephants have been observed to have home-ranges of 100-350km^2 (Poole and Taylor, 1999). They are known to traverse varied habitat, not restricting themselves to one place for more than several days (Shoshani and Eisenberg, 1982).

The observed temple elephants (irrespective of ownership) had the following provisions in their shelter:

- All temples (N=21) had an open shelter; 83% elephants had open shelter (N^a = 86; considering number of elephants irrespective of ownership)
- Mean area (inclusive of other elephants in each temple) was 0.037 Km^2 (N^a = 32), Guruvayoor elephants had a mean area of 0.07Km^2. Mean area for each elephant (area where the elephant is tied/ kept) was 0.000032 Km^2 spending between 10 – 24hrs a day within. Mean area for Guruvayoor elephants (area where the elephant is tied/ kept) was 0.00004 Km^2 within which it was kept for 16-20h/day during off-seasons (non-working period).
- 86% of temples (N= 21; irrespective of number of elephants maintained) had sand/ earthen floor, this value was 95% (N^a = 82) when number of elephants was considered irrespective of number of temples. Only three elephants had concrete flooring; all Guruvayoor elephants had earthen flooring
- Except one, all elephants had access to shade but of differing quality
- Shelter was cleaned daily or once in two days with stick, broom

M-R was 4.0 (SE= 1.3, N*= 8) indicating a deviation of 50% from E-R, considering temples only (irrespective of number of elephants held).

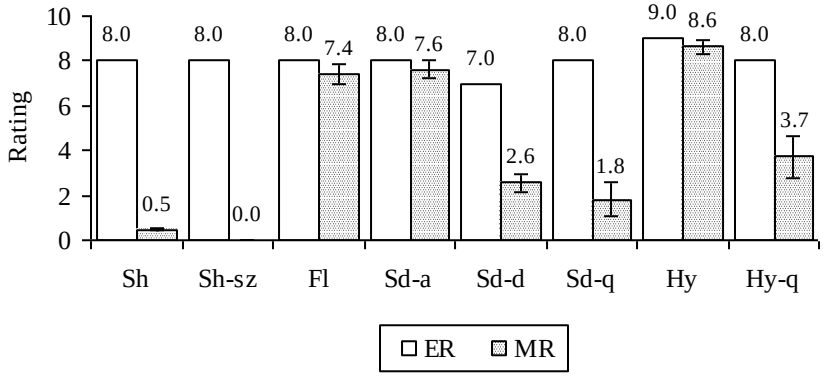
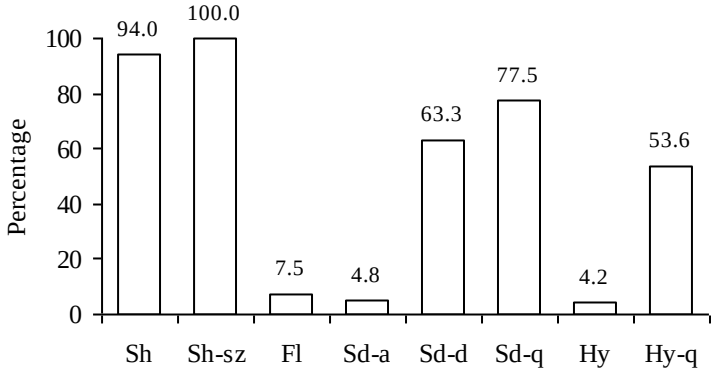


Figure 3: Comparison of E-R and M-R for 'shelter' sub-parameters



Sh-t: Shelter type Sh-sz: Shelter size Fl: Flooring Sd-a: Shade availability Sd-d: Shade availability (day)
Sd-q: Shade quality Hy: Hygiene maintenance Hy-q: Quality of hygiene maintenance

Figure 4: Percentage wise deviation from E-R for shelter

Water and related features

Water maybe important for elephants not only because of their need to drink, but also to engage in socializing behaviours around a water-source. In addition, bathing helps maintain body temperature during hot weather conditions (McKay, 1973).

This parameter has been assessed considering the temples (independent of number of elephants) for features which are external to the elephants and controlled by their handlers/ managers.

a. Following features were provided for the observed elephants:

- All the temples had access to water: most common source was well, followed by rivers, taps and ponds; in terms of temples: 45% used wells as water source, ponds were seen in 15% of the temples; 12 temples had more than one source of water, all Guruvayoor elephants had ponds as water-source mainly for bathing; in terms of

number of elephants: 70% animals had ponds as water source, 15% wells and only 10% had rivers/ streams.

- Distance to water source varied 3.3-102.8m (well), 25-5500m (river), 3.3-33.3m (tap) and 3.3- 91.4m (ponds). For Guruvayoor elephants distance ranged from 5-250m.
- Water quality analysis was not done in any of the observed temples (N = 17).
- Bath frequency varied from daily to fortnightly with the bathing place being the tethering site, pond or river. The percentage of bathing frequency of once in two days was maximum across number of temples (56%) and number of elephants (85%) followed by daily baths (31%) and (10%) respectively. For Guruvayoor elephants, bathing place was the pond. Bathing was done using such scrubbing materials as coconut husk/ pumice stone/ ceramic stones
- Bath duration varied from 2-5h (considering all elephants together)

M-R for this parameter was 3.5 (SE = 1.01, N* = 6) for the temples observed— irrespective of number of elephants— indicating a deviation of 50.3% from E-R.

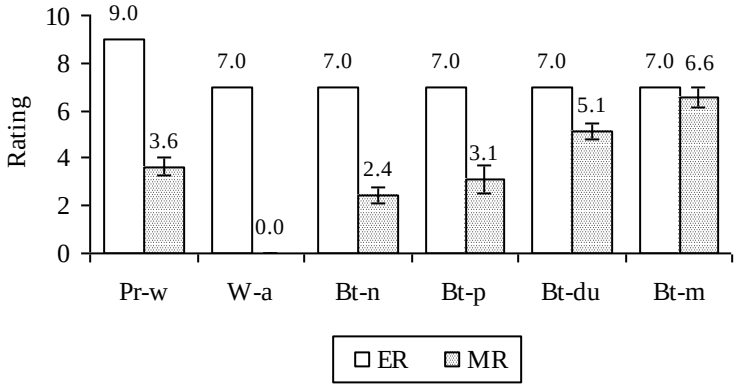
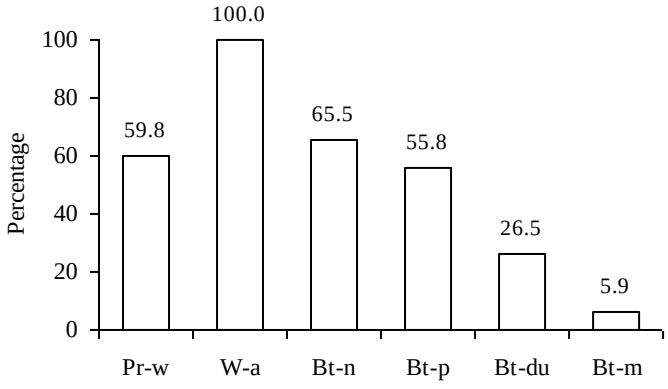


Figure 5: Comparison of E-R and M-R for 'water' sub-parameters



Pr-w: Availability of perennial source of running water
Bt-n: Number of times bathed
Bt-du: Bath duration
W-a: Water analysis
Bt-p: Bathing place
Bt-m: Bathing materials

Figure 6: Percentage wise deviation from E-R for 'water' sub-parameters

Sleep
For their sleeping place, the elephants are dependent on the location provided by their handlers/ managers. Hence this aspect was rated across temples (N= 21), independent of the number of elephants maintained.

- Sleeping place across the observed temples was the tethering place/ enclosure when not working.
- While working, the place varied depending on the location.

M-R was 0.5 (SE = 0.04, N*=1) showing a deviation of 94% from E-R for this sub-parameter.

Sleep duration was considered across individual elephants:

- During off-season, when not working, duration ranged from 4-8h (N^a= 85)
- While working, duration ranged from 2-5h (N^a= 12)

M-R for duration (in shelter) was 6.5 (SE= 0.34, N= 85) showing a deviation of 19% from E-R. M-R for duration (working) was 5.7 (SE= 1.1, N= 12) with a deviation of 29% from E-R.

Walk
Owing to the nature of the work performed, temple elephants may be subjected to varying periods of walking. This may be on several kinds of substrates. This was rated across temples (irrespective of number of elephants).

- 50% (N= 70) of elephants (irrespective of number of temples) were not walked. For Guruvayoor elephants, 70% (N= 45) were not walked.
- In terms of number of temples, 18% (N= 22) did not provide opportunity to walk for its elephants.

M-R was 7.4 for opportunity to walk (SE= 0.8, N= 22) showing a deviation of 49% from E-R, based on number of temples only.

- Nature of terrain was tarred roads/ village roads/ mud roads for the temples observed

M-R was 1.8 (SE= 0.6, N= 13) indicating a deviation of 77% from E-R.

Social interaction
Opportunity for interaction with conspecifics includes number of individuals, distance between them and duration. Opportunity for social interaction is a consequence of the management practice adopted; hence, this was rated across number of temples observed.

- In terms of number of temples, 76% (N=21) did not provide for social interaction during off-season and only 5% did not have provision for interaction while working; in terms of number of elephants, 80% (N^a= 87) of all elephants had opportunity for

interaction during off-season (with 69% of these elephants belonging to Guruvayoor temple)

- 99% of elephants (N^a= 67) were allowed interaction while working with 60% of these elephants belonging to Guruvayoor temple
- Duration ranged from 5-10h while working (festive season)
- Duration ranged from 1-2h to 20-24h during off-season
- Group size ranged from 1 (off-season) to 1-20 (working)

M-R was 4.5 (SE= 1.5, N*= 5) indicating a deviation of 44% from E-R considering across temples (irrespective of number of elephants maintained).

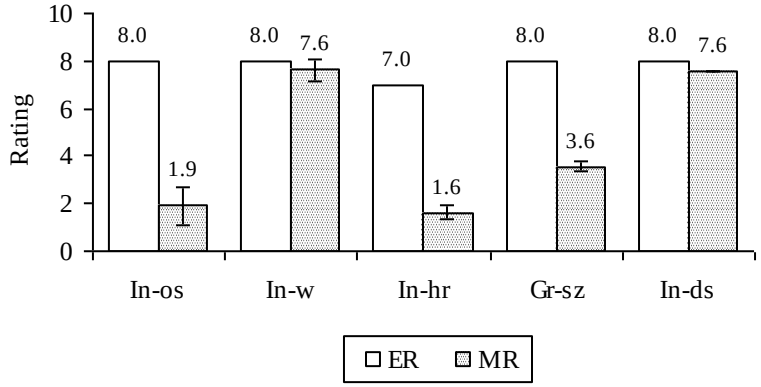


Figure 7: Comparison of E-R and M-R for 'social interaction' sub-parameters

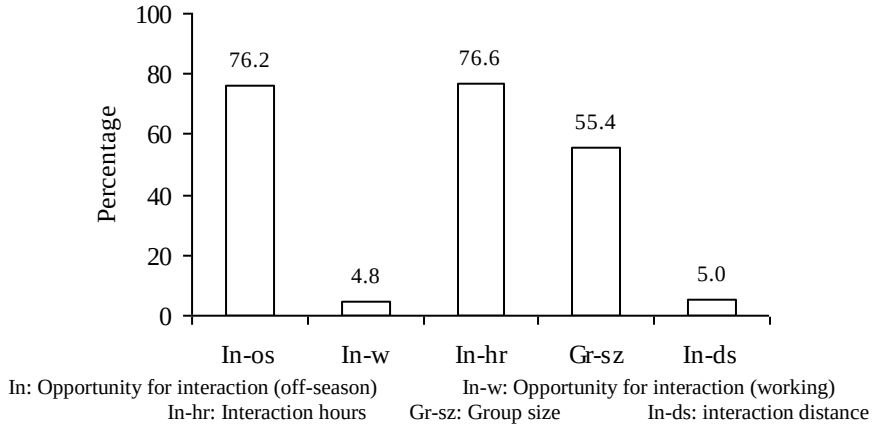


Figure 8: Percentage wise deviation from E-R for 'water' sub-parameters

Chaining

While space constraints and absence of natural boundaries may necessitate chaining of elephants, an equally important cause could be the temperament of the animal. Hence, this parameter has been considered across all observed elephants (independent of number of temples).

- All (100%) elephants were chained in more than one region: leg-neck/ leg-body/ leg-body-hobbles

- Mean chain weight was 11.5Kgs (leg), 12.8Kgs (body) and 7.9Kgs (hobbles); chain length was 4.9m (leg), 5.8m (body) and 2.9m (hobbles)— exclusive of Guruvayoor elephants
- Chaining duration depended on whether the elephants were working or not: off-season duration ranged from 18-22h (all elephants); while working this duration ranged from 2-3 to 10-15h (exclusive of Guruvayoor elephants).
- 54% of all elephants were shackled using hobbles, of which 67% were Guruvayoor elephants.
- None of the elephants were allowed to free range at any time of the day.

M-R for this parameter was 1.2 (SE= 0.8, N*= 7) considering all elephants (irrespective of number of temples). A deviation of 85% from E-R was observed.

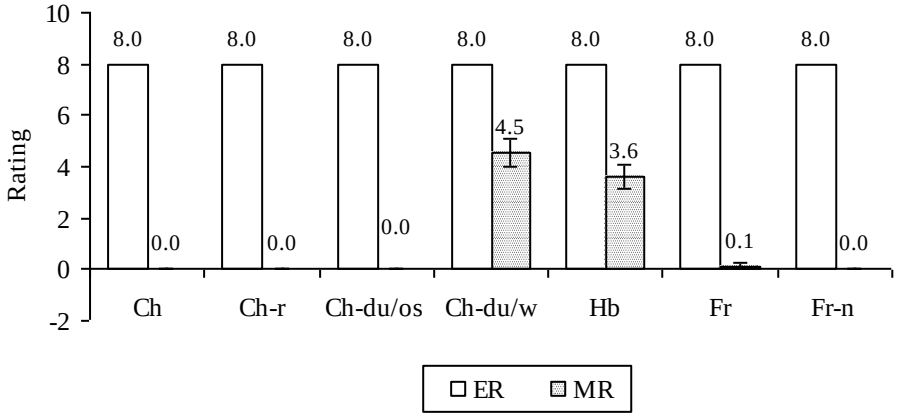
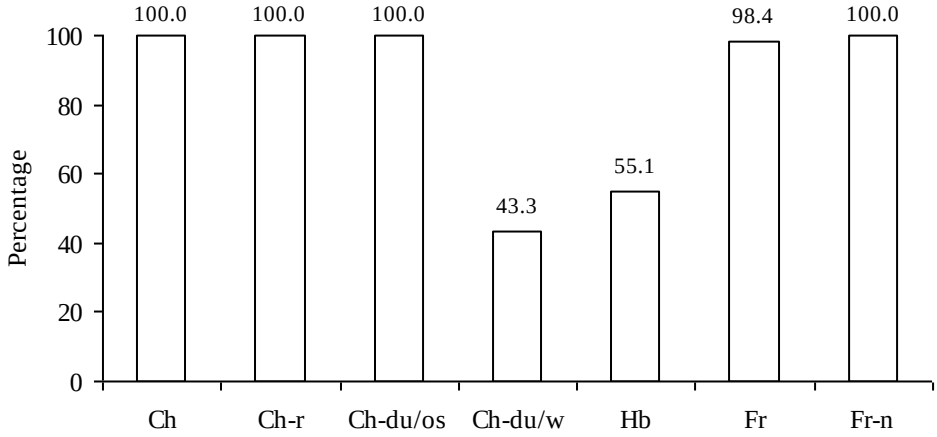


Figure 9: Comparison of E-R and M-R for 'chaining' sub-parameters



Ch: Chaining status Ch-r: Region of chaining Ch-du/os: Chaining duration (off-season)
Ch-du/w: Chaining duration (working) Hb: Hobbling Fr: Opportunity for free-ranging
Fr-n: Free-ranging at night

Figure 10: Percentage wise deviation from E-R for 'chaining' sub-parameters

Observed behaviour

Manageability of elephants was rated by considering its temperament, incidence of aggression. Occurrence of abnormal behaviours, stereotypy, was also rated. This parameter was rated by considering all elephants (independent of number of elephants maintained by each temple). Behaviour and related features can be considered to be an expression of interaction between the outside world and characteristic nature of each elephant. Since external environment has been considered separately, it is the individual characteristic which may be considered for rating for this parameter.

- 63% of all elephants were described as quiet/ reliable (n=23), of this, Guruvayoor elephants accounted for 33%.
- 27% were described as undependable/ agitated/ nervous (n=10).
- 48% (n=11) of the elephants had injured/ killed public/ handlers.
- 56% (n=13) of all elephants exhibited stereotypic behaviour such as body/ head swaying/ trunk biting, most were described as being of medium intensity

"n" refers to actual number of elephants for which particular feature of interest was recorded.

M-R was 4.2 (SE= 0.6, N*=4) indicating a deviation of 47% from E-R for this parameter considering number of elephants, irrespective of number of temples.

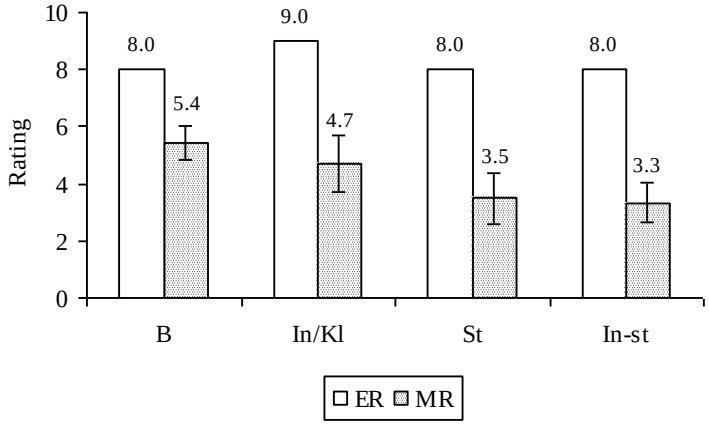
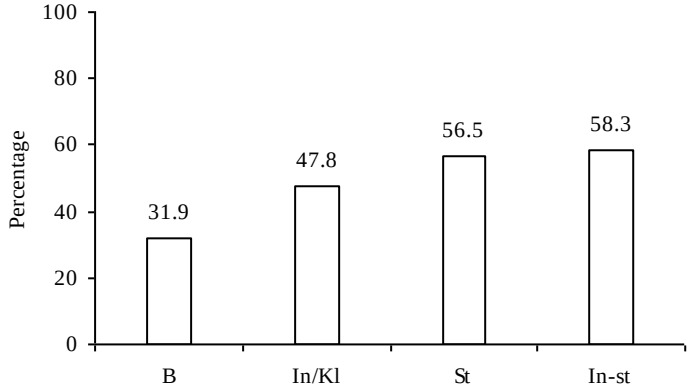


Figure 11: Comparison of E-R and M-R for 'behaviour' sub-parameters



B: Observed behaviour In/kl: Incidents of injury/ killing St: Stereotypic behaviour In-st: Intensity of stereotypty

Figure 12: Percentage wise deviation from E-R for 'behaviour' sub-parameters

Food

Food provisioning in the form of stall feed/ free-ranging opportunity is important keeping elephants' behavioural biology in perspective. Along with this, husbandry practices such as number of food types given/ provision of supplements/ ration chart usage, have been rated.

- All (100%) elephants (N^a= 86) were given only stall feed
- Feeding place was the enclosure/ shelter (off-season) or any wayside place/ temporary camp-site while working
- 87% of the places were said to maintain good hygiene in the feeding place (of this, 68% was accounted by Guruvayoor elephants).
- Feeding duration ranged from 3.5-10.0h (working), 6-10h (off-season)/ 18-20 (off-season for Guruvayoor elephants)
- Food items given were: Coconut (*Cocos nucifera*) branches, Banana fruits/ plantain (*Musa* sp.) trunk, water melon (*Citrullus vulgaris*), rice (*Oryza* sp.), rice flakes, rice and turmeric (*Curcuma longa*), sugarcane (*Saccharum* sp.), Palm leaves (Family Arecaceae), *Caryota* palms; for Guruvayoor elephants: Rice, rice flakes, Banana, Green grass, Horse-gram (*Macrotyloma uniflorum*), Green-gram (*Vigna radiata*), Stem of plantain (banana) tree, dates (*Phoenix dactylifera*), Cucumber (*Cucumis sativus*), common salt, jaggery (unrefined sugar from sugarcane),Watermelon, rice and turmeric (all the items listed were not given together)
- Ration charts were not used for 27% (n= 16) of the observed elephants, while ration charts were used for all Guruvayoor elephants
- Mineral mix was not given for any of the observed elephants (n= 18), no data on Guruvayoor elephants
- 67% (n= 48) were given altered food during musth/ lactation, of this, 65% (n= 47) belonged to Guruvayoor.

"n" refers to actual number of elephants for which particular feature of interest was recorded.

M-R was 1.8 (SE= 0.8, N*= 7) showing a deviation of 78% from E-R for this parameter across temples (irrespective of number of elephants maintained). Figures 13 and 14 show E-R and M-R for 'food' sub-parameters considering number of temples (irrespective of number of elephants maintained per temple).

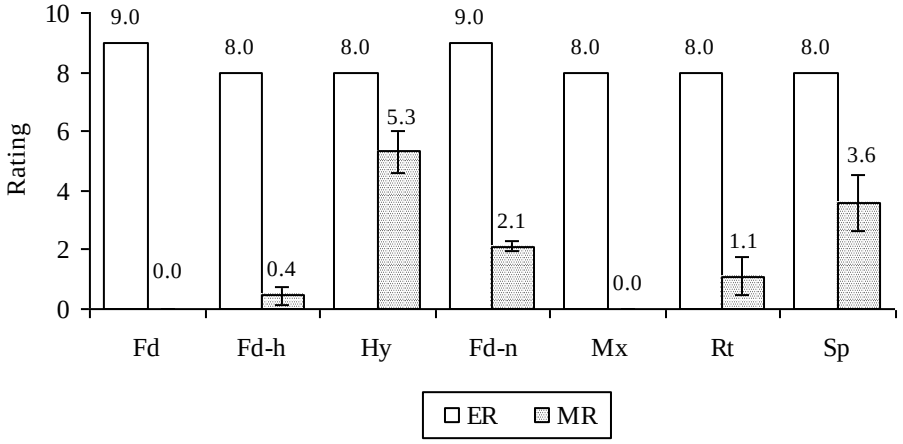
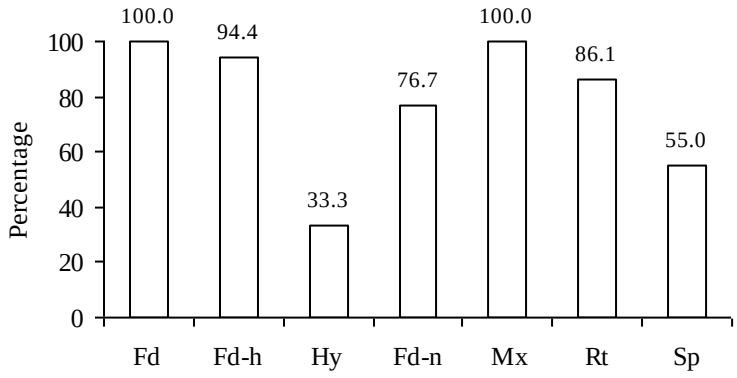


Figure 13: Comparison of E-R and M-R for 'food' sub-parameters



Fd: Food provisioning type Fd-h: Feeding hours Hy: Hygiene of feeding place Fd-n: Food types (Number)
M-x: Provision of mineral mix Rt: Usage of ration chart
Sp: Provision of special food during physiological changes

Figure 14: Percentage wise deviation from E-R for 'food' sub-parameters

Work

Purpose of keeping elephants and the work performed are closely linked: when elephants are kept for revenue generation, the work performed is generally un-natural to the elephant's normal behavioural repertoire. As this parameter is controlled by people and is external to the elephant, it has been rated considering the number of temples (independent of number of elephants maintained).

- Only 10% (N= 21) temples were not using elephants for work (either maintaining single / more than one elephant); 7% of the elephants (N^a= 84) were not used for work
- All the observed elephants were used for festivals/ temple rituals/ processions/ parades such as: "*Parayadi/Paraedupp, Aarattu, Ezhunnallippu and Procession (siveli), Vilakku-pooram*"
- Work duration ranged from 6-12h— morning and night, 4h (off-season); for Guruvayoor elephants, duration ranged from 8-10h (morning and night).
- Work period was during the festival season: with the elephants attending between 40-100 programs/ season located at a distance of 35-150Kms (Figure 15), generating an income of Rs.1000-5000/festival; Guruvayoor elephants worked between 5 to 15-20 days during the festival season
- Mean duration an elephant was made to stand per festival was 3.9h (day) and 3.5h (night). The duration ranged from 1.5-5.5h (day) and 1.5-6.0h (night). For Guruvayoor elephants, mean duration of standing was 4.6h (day, ranging from 1.5-5.5) and 4.3h (night, ranging from 2.5-5.5).

M-R was 3.0 (SE= 1.3, N*= 9) indicating a deviation of 63% from E-R (considering only temples and not the number of elephants maintained per temple). Figures 16 and 17 show comparative rating and Percentage wise deviation respectively, for this parameter.

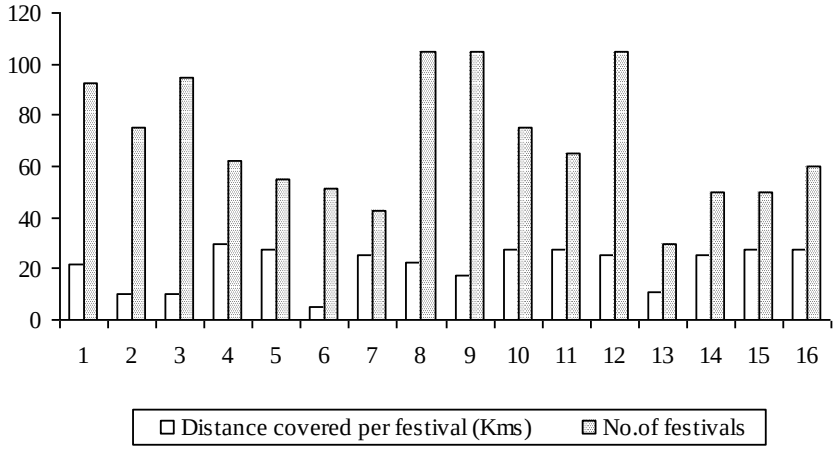


Figure 15: Distance covered by walking during the festival season (excluding Guruvayoor elephants)

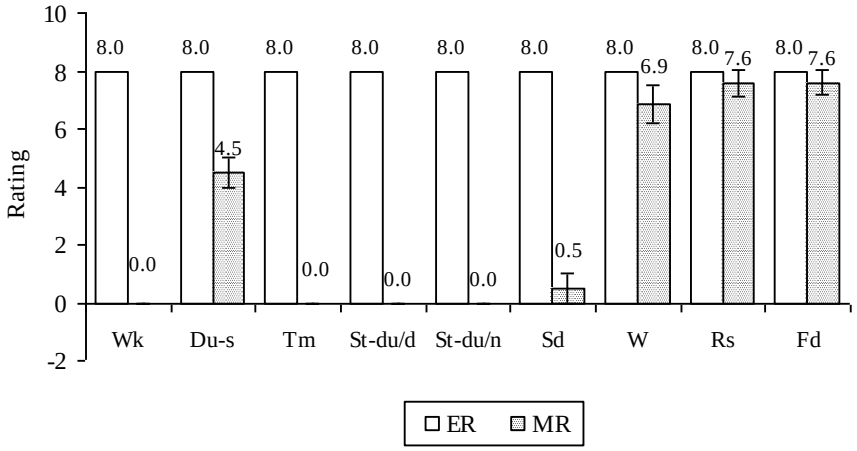


Figure 16: Comparison of E-R and M-R for work sub-parameters

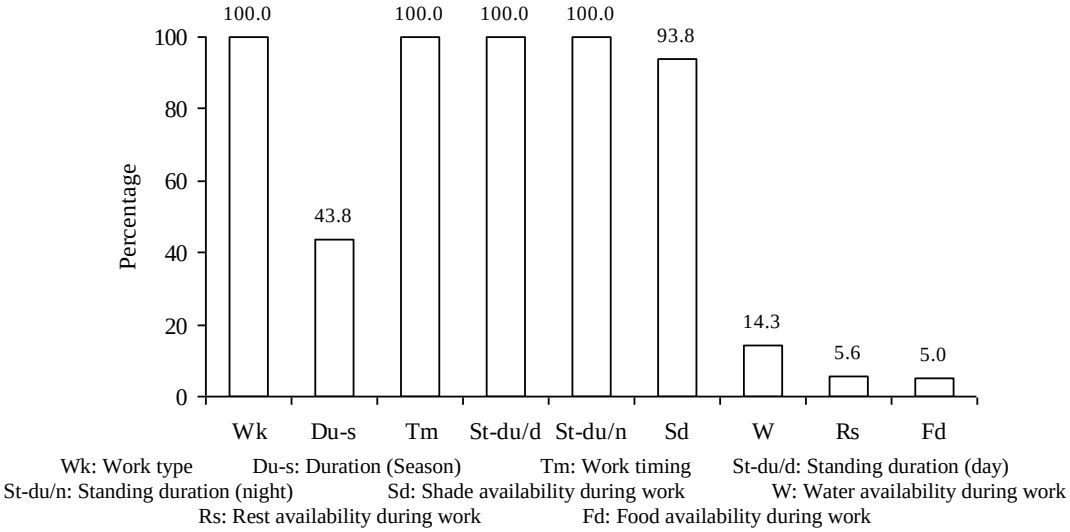


Figure 17: Percentage wise deviation from E-R for work sub-parameters

Reproductive status

Unfavourable captive conditions such as absence of members of opposite sex/ restricted movement of animals/ absence of normal reproductive functioning among adult elephants lead to abnormal or no reproductive functioning. Additionally, absence of normal reproductive function could be associated with stress among the animals (Clubb and Mason, 2002).

- For the female elephants, data was available for only two: both were exposed to males during festivals, were not given opportunity to breed
- Except for one elephant (a 58y old male), musth for reported for all males.
- Musth males were isolated/ watered/chained for the duration
- Males in musth were reported to be aggressive towards handlers/ strangers
- Post musth problems were seen through loss of body condition/ chain wounds caused by absrasion
- 31% temples (N= 16) had male elephants that had not sired an offspring; in terms of number of elephants, 52% had not sired any offspring

M-R was 2.1 (SE= 1.0, N*= 8) indicating a difference of 73% from E-R considered across elephants, irrespective of number of temples.

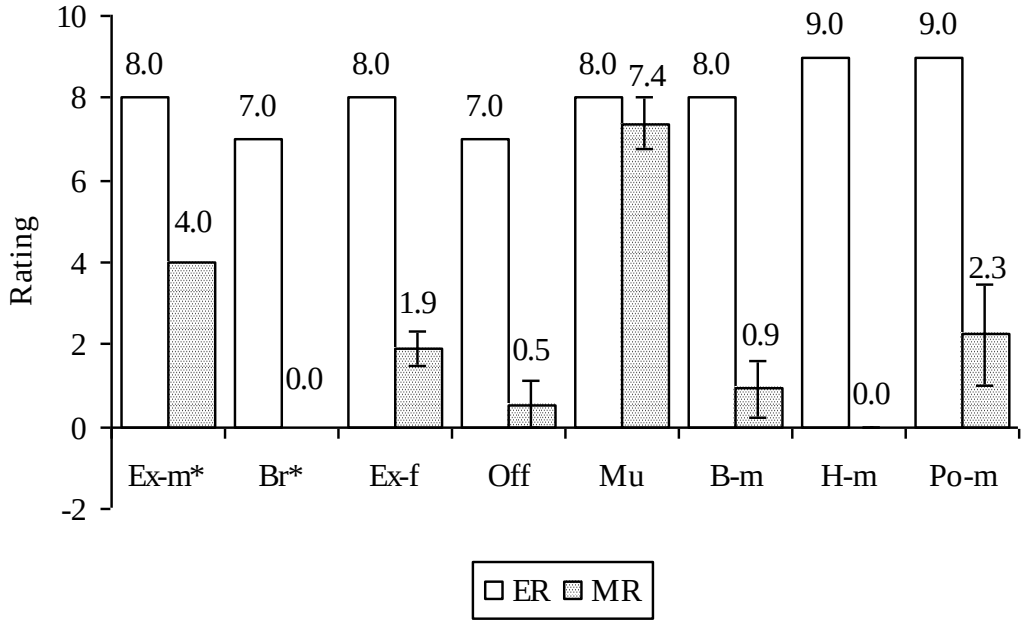
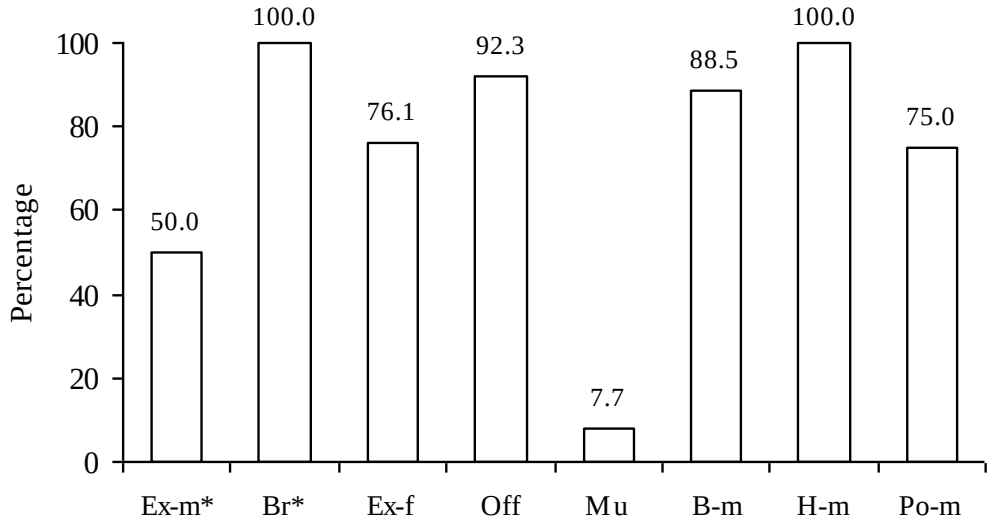


Figure 18: Comparison of E-R and M-R for 'reproductive status' sub-parameters



Ex-m: Exposure to males Br: Breeding opportunity Ex-f: Exposure to females Off: Offspring sired
Mu: Occurrence of musth B-m: Behaviuoural changes during musth H-m: Handling of musth Po-m: Post musth problems
*: observed for two elephants only

Figure 19: Percentage wise deviation from E-R for 'reproductive status' sub-parameters

Health and veterinary routine

Occurrence of disease/ injury pertains to the elephant; hence, this has been rated across elephants, irrespective of temples. Veterinary schedules such as deworming/ immunization, sample testing, etc., are dependent on the management of each temple, hence rating has been considered across temples (irrespective of number of elephants maintained by each).

- Occurrence of wheezing, foot-rot, oozing of pus from trunk, colic, loss of vision and abrasion marks on legs were reported for the elephants

M-R for nature of disease/ injury was 5.5 (SE= 0.7, N*=1) considering the number of elephants (N^a= 21) across all temples.

- 33% temples did not deworm their elephants; all temples did not practice immunization of at least some of their elephants; sample testing of dung/ urine/ blood was reported for only one temple; Body measurements of elephants were not taken in 38% of observed temples (N=16)

M-R was 2.9 (SE= 1.1, N*= 7) indicating a deviation of 59% from E-R, considering the temples (irrespective of number of elephants maintained).

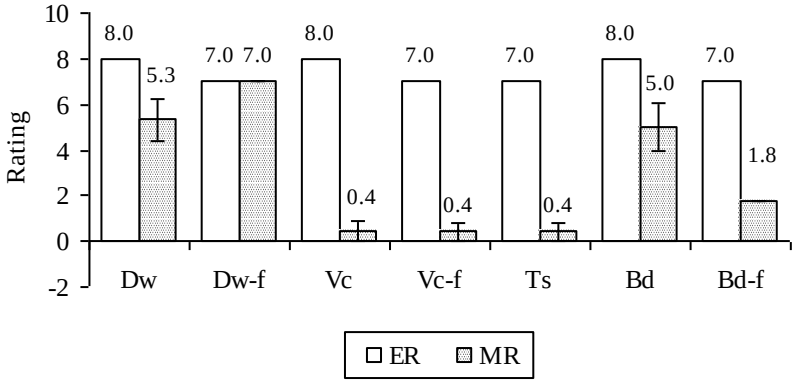
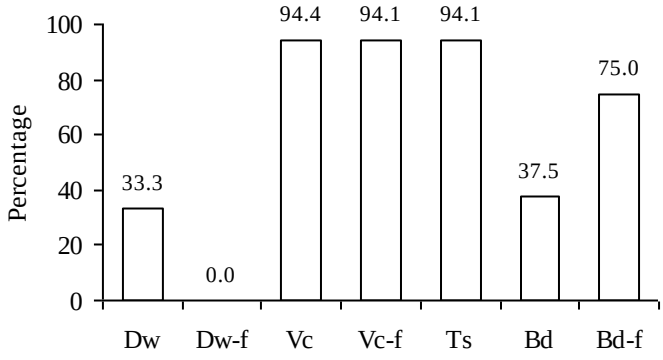


Figure 20: Comparison of E-R and M-R for 'health and veterinary routine' sub-parameters



Dw: Deworming done | Dw-f: frequency of deworming | Vc: Vaccination done
Vc-f: Vaccination frequency | Ts: blood/ dung / urine sample tests | Bd: Body measurements taken
Bd-f: Frequency of body measurements

Figure 21: Percentage wise deviation from E-R for 'health and veterinary routine' sub-parameters

Veterinary personnel and infrastructure

Availability of veterinary doctors with experience in treating elephants is important in health maintenance. This has to be coupled with the provision of suitable infrastructure. This parameter has been rated across temples (irrespective of the number of elephants maintained).

- All temples (N= 20) had access to a veterinary doctor with varied experience with elephants
- Most doctors were on call (N= 16) or visited monthly (N= 4), with one temple (Guruvayoor) reporting daily visits by the doctor
- Veterinary assistants were available for all temples
- Eight temples did not have veterinary clinic facility
- Facilities such as staff quarters/ cooking shed/ animals stand, etc varied across temples with five temples having only provision of staff quarters and elephant equipment such as chains
- Except two, all temples maintained records relating to health/ service/ clinic

M-R was 5.6 (SE= 0.9, N*= 8) showing a deviation of 31% from E-R considering only the temples, irrespective of number of elephants maintained.

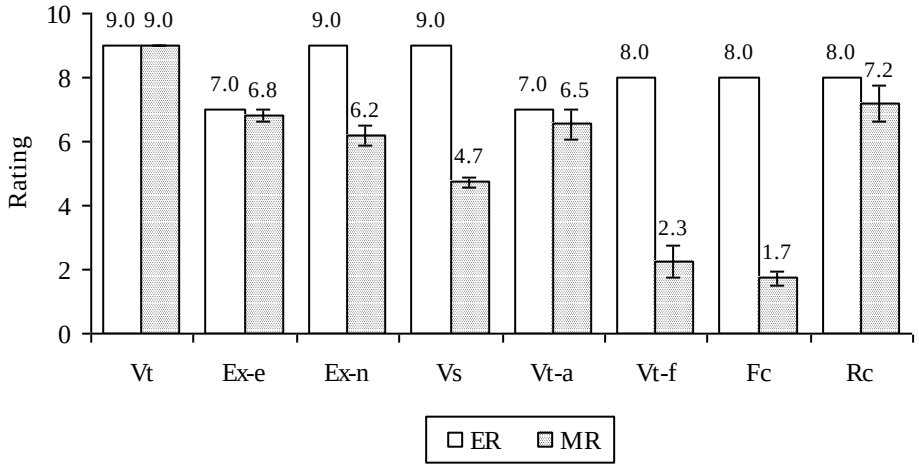
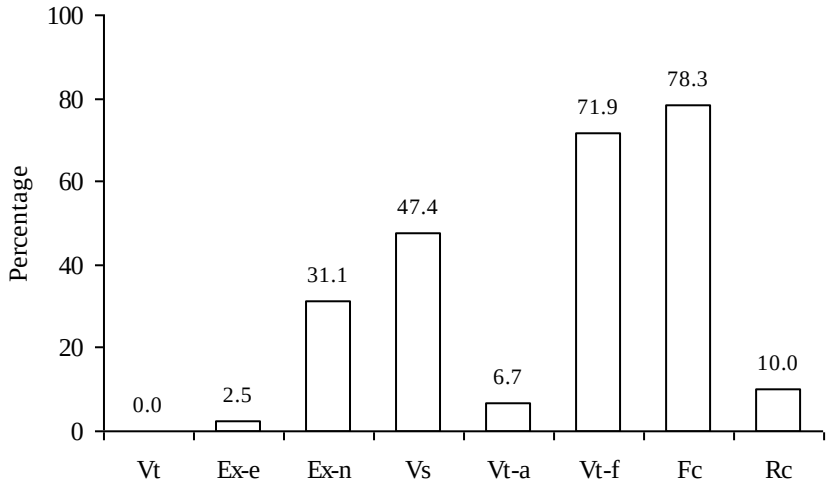


Figure 22: Comparison of E-R and M-R for 'veterinary personnel and infrastructure' sub-parameters



Vt: Availability of veterinary doctor Ex-e: Experience with elephants Ex-n: Number of years of experience
VS: Doctors visits Vt-a: Availability of veterinary assistant Vt-f: Veterinary clinic facility
Fc: Other facilities Rc: Record keeping

Figure 23: Percentage wise deviation from E-R for 'veterinary personnel and infrastructure' sub-parameters

Professional experience and socio-economic status of mahouts/ cawadis

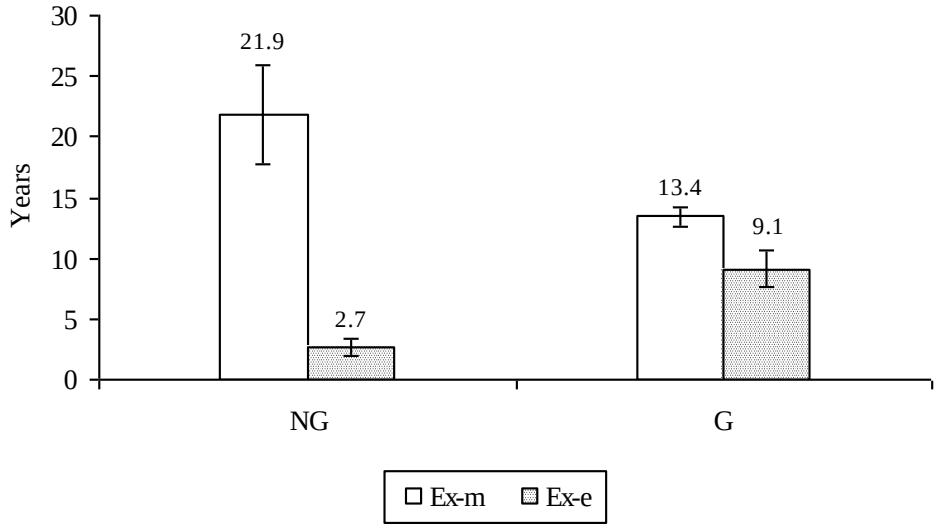
Data on 155 mahouts/ assistants was collected across the observed temples. Mean age was 39.8y (SE= 2.6, N= 17) ranging from 25-60y.

Professional experience

Absence of knowledge of elephants can be life-threatening to both handler and elephants. Hence, professional experience was rated based on number of years of experience with a specific elephant, whether the handler was trained/ not, presence of relatives in the same field.

- Mean number of years of experience in this profession was 13.9y (SE= 0.8, N= 121) ranging from 2-38y. Figure 24 compares the number of years of experience of handlers across all temples with those of Guruvayoor handlers.
- Reason for a mahout working with more than one elephant varied: the handler was shifted to another elephant, handler left job because of low salary, elephant was sold or handler was suspended
- 34% of handlers were not trained
- Handlers' knowledge of commands was described as average for only 10% of mahouts/cawadies, the rest were said to be good
- Mean hours spent with elephant while working was 17h (SE= 2.9, N= 6) while this duration during off-season was 6.4 (SE= 0.1, N= 107)

M-R was 5.9 (SE= 1.1, N*= 5) indicating a difference of 35% from E-R considering all handlers (irrespective of number of temples).



Ex-m: Experience as mahout Ex-e: Experience with specific elephant
NG: Non-Guruvayoor temples G: Guruvayoor temple

Figure 25: Comparison of mean years of experience of handlers

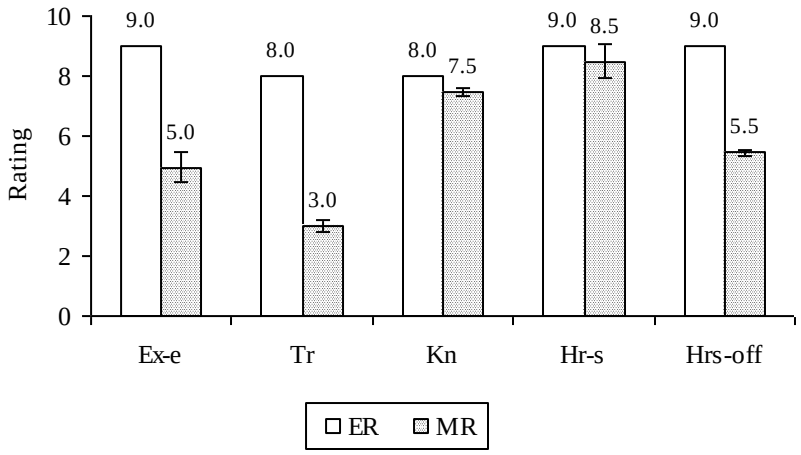
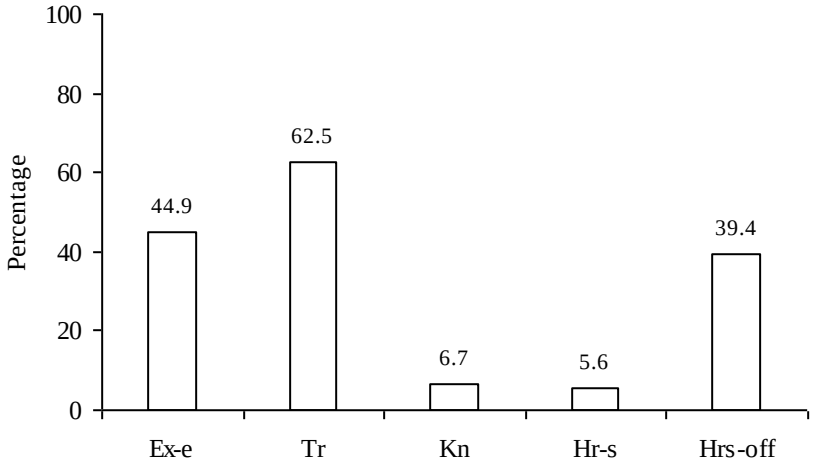


Figure 26: Comparison of rating for 'handlers' professional experience' sub-parameters



Ex-e: Experience (as % of elephant age) Tr: Training status Kn: Knowledge of commands
Hr-s: Hours spent with elephant (while working) Hrs-off: Hours spent with elephant during off-season

Figure 27: Percentage wise deviation from E-R for 'handlers' professional experience' sub-parameters

Socio-economic status

Handlers' economic and social profile is an important indicator of his/ her welfare status. Poor social security may lead to improper handling of elephants and poor efficiency of work.

- 70% of handlers (N = 13) had relatives in the same profession, 50% (N= 16) reported a family occupation not associated with handling elephants
- Education status ranged from 5th to pre-graduate level; all were literate
- Mean annual salary was Rs. 50,954/- ranging from Rs. 36,000/- to 84,000/-

- Number of children per family ranged from 0 to 4
- 7% of handlers were not covered by insurance; those with insurance cover, working for Guruvayoor temple, were provided by the temple itself
- 76% of handlers were said to consume alcohol, all after work hours

M-R was 4.5 (SE= 0.7, N*= 9) with a deviation of 36% from E-R, considering all handlers (irrespective of number of temples).

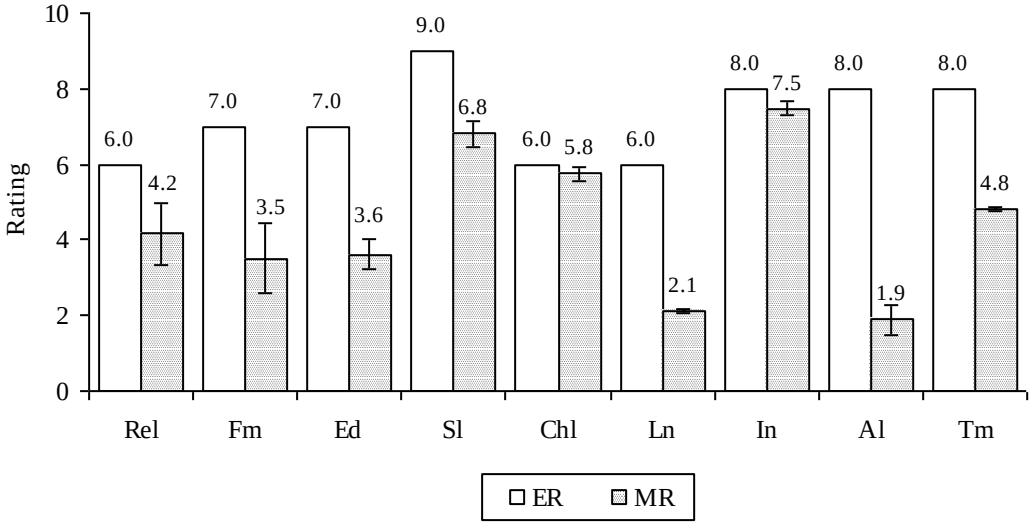
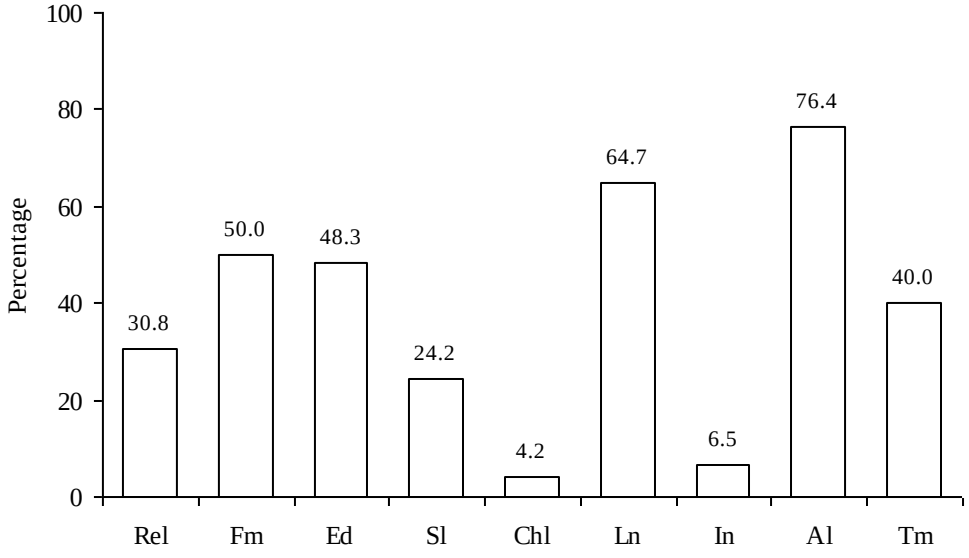


Figure 28: Comparison of rating for 'handlers' socio-economic status' sub-parameters



Rel: Relatives as handlers Fam: Family occupation Edu: Education status Sal: Salary drawn
Chl: Number of children Ln: Languages known In: Insurance availability Al: Alcohol consumption
Tm: Timings of consumption

Figure 29: Percentage wise deviation from E-R for 'handlers' socio-economic status' sub-parameters

Overall Welfare Status

Overall M-R was 3.3 (SE= 0.3, N*= 76) showing a deviation of 59% from overall E-R implying, on an average, a difference of 60% would be noticed. Figure 24 gives the distribution of Percentage wise deviation for the observed parameters. Most occurrences were seen for maximum deviation (91-100%) from E-R. 55% of the parameters (N= 76) showed a deviation of 50% or more from E-R implying absence of suitable features to this extent for more than half of the observed parameters. These parameters were spread across all the observed features: shelter/ water/ chaining/ physical exercise (walk)/ feeding/ work/ behaviour/ reproductive status and veterinary care.

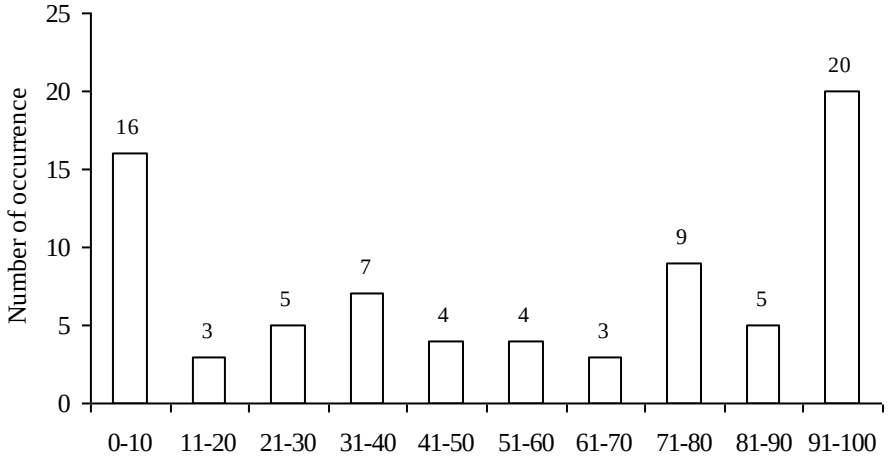


Figure 24: Distribution of deviation from E-R for the observed parameters

Discussion

The distribution of elephants across temples was uneven with the Guruvayoor temple accounting for 69% of the elephants observed. Excluding this temple, the number of elephants per temple ranged from 1 to 7. Hence, the results presented here represent mean rating obtained by a combination of means across temples (independent of number of elephants held) and across all elephants (irrespective of each temple).

Features showing deviation of more than 50% from E-R:

- One common aspect of 99.9% of the observed elephants was their source: all were purchased/ donated to the temple. Their previous history was not known. Despite this, it is clear that the animals undergo change in their ownership and a consequent change in their living conditions. This itself can be a source of stress for the elephants as new daily routines maybe introduced/ changed, different handlers may be involved in caring for the animal– the number of elephants each mahout had worked with ranged from 1-31.

Absence of natural conditions:

- Studies on wild elephants have shown the distances traveled as they forage across varied habitat for 12-18h / day (Poole and Granli, 2009; Sukumar, 2006). All observed temple elephants were confined to their open shelters for at least 16h/day when not working.

- A feature affecting all aspects of the elephant's life was chaining: the elephants were chained for at least 70% of a day (when not working). This ensured inaccessibility of essential features to the animal— water when it needed to drink/bathe/ movement from its place of confinement/ interaction through physical contact with conspecifics. Chaining ensured loss of opportunity to perform behaviours that would provide physical/ psychological stimulation to the animal; the elephants were also reported to exhibit stereotypic behaviours. Gruber et al., (2000) report increased incidence of stereotypy among chained elephants as compared to those that were penned.
- Most elephants were provided water through ponds/ wells. This meant inaccessibility when the elephant needed to drink/ bathe; species-typical behaviours such as dust bath/ wallow could not be performed
- None of the elephants were allowed to forage: all were provided only stall feed. This restricted the number of food plants available to the animal; opportunity to engage in the dominant activity observed for wild elephants— foraging— was thus absent.
- The work performed defined all aspects of the elephants' life— depending on the schedule of work, facilities were provided to elephants. For durations ranging from 25-50% of a day, the elephants were made to participate in different festivals, having to cover the distance between these locations either by walk/ other forms of transport. Thus, feeding/ resting/ sleeping/ bathing/ social interaction were all subject to this schedule during working season. Work involved standing in one place for a mean duration of 4h during the day and at night. Poole and Granli (2009) state wild elephants spend around 5% of daylight hours standing (this includes comfort activities/ drinking). This implies a maximum of one hour of standing as an activity by itself. Thus, the temple elephants were made to engage in this activity eight times more than the maximum observed for their wild counterparts. This activity, it should be noted, was repeated for the entire working season, lasting from November to May.
- Reproductive status of the elephants was marked by lack of opportunity: either due to absence of individuals of opposite sex/ or by restricted movement due to chaining; males had not sired offspring despite their physiological maturity

Veterinary procedures

- Practice such as deworming/ immunization/ sample testing were not followed systematically; immunization or its absence was compounded by the fact that owners/mahouts do not consider inoculation against tetanus as "immunization". Thus, absence of the practice of vaccination may imply immunization against tetanus is done.

Handlers' status:

- Despite the established history of elephant keeping in Kerala, 50% of the interviewed mahouts/ cawadis, for the temples observed, came from a family background not associated with handling elephants. This implies new entrants into this profession and older, trained handlers' offspring not opting for the profession
- Correspondingly, mean years of experience in the profession was only 20y (exclusive of Guruvayoor temple) and 13y for Guruvayoor elephant handlers.

- Nearly 50% of observed elephants were reported to have killed/ injured handlers/ public, males were aggressive towards handlers while in musth: features that make this profession dangerous to both elephant and handler.
- Alcohol consumption was prevalent among all the handlers

Comparison between observed temples and Guruvayoor temple elephants:

a. Open type shelter for all temples with earthen flooring
b. Wells, taps, ponds, rivers/ streams as water source for use by elephants; Guruvayoor elephants – pond water
c. Only three elephants belonging to different temples not walked; 70% elephants of Guruvayoor temple not walked
d. Five temples provided for social interaction when not working; all Guruvayoor elephants had opportunity for interaction but restricted by chaining for 16-20h
e. No difference between elephants in food provisioning type
f. All elephants used for temple rituals/ processions/ festivals

Observations on handlers/ owners/ managers associated with temples:

- This management regime appears to have inexperienced owners/ managers with poor knowledge of elephants
- Non-observance of customs or traditions associated with elephant keeping n Kerala
- Political interference in mahout management
- Improper methodology of mahout selection

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Section 5:
Captive Elephants under Private Ownership

Executive summary

Elephants traditionally owned by big landlords in Kerala have changed to individual ownership along with a shift in predominant work type from timber to use in festivals. Kerala has the maximum number of privately owned elephants (72%), with an owner to elephant ratio of 1:1.5.

The welfare status of elephants kept under private ownership in Kerala was assessed based on a rating scale. The rating scale from unsuitable conditions to suitable conditions was used to assess the welfare status of captive elephants and their handlers.

The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter, defined as Experts' Rating (E-R). Mean Rating (M-R) representing the actual situation existing for the elephant/s was obtained through the ground survey. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.

The investigation was carried out for 44 elephants (41 males, 3 females); belonging to 25 owners. Number of elephants per owner ranged from 1- 11, most owners (N= 17) maintaining one elephant only. Age of males ranged from 5-60, female age ranged from 27-40 yrs.

All elephants were purchased from different sources, across six states: Kerala, Bihar, Assam, Karnataka, Uttar Pradesh and Andaman. Most elephants were purchased from Kerala (12) followed by Bihar (11); sourcing of elephants from Kerala may also include those elephants originally acquired from other regions, but having been sold/ gifted across owners within Kerala. M-R was 1.5 (SE= 0.0, N= 43) showing a deviation of 75% from E-R.

All elephants were maintained for use in festivals/ processions/ religious functions. M-R was 0.3 (SE= 0.1, N= 39) indicating a deviation of 96% from E-R.

Sixty nine percent of elephants were kept in open type of shelters exposing the elephants to summer heat/ monsoon rain; a shed was provided for some. Shelter size ranged from 405- 8, 09,400 $km^{2,}$ but the space where elephant was tied/ kept ranged from 0.000009- 0.0000372 km^2.

The elephants spent an average of 19h (ranging from10- 24h) within this space during off-season (when not working); mean hours outside shelter was 6h (ranging from 0 – 24) either for work or for bathing/ bringing fodder. One male elephant (42.5y) was used for work in the neighboring state of Kerala and kept in the shelter with owner from January to April. M-R was 4 implying a deviation of 47% from E-R.

Ninety five percent of the elephants were provided with water from bore well/ open well/ tap water, including those which provided more than one source of water. 62% owners provided more than one source of water. 48% elephants had access to rivers/ streams/ canals as a source of water. Distance to water source ranged from within the enclosure to 3-4 km.

Bath frequency varied from daily or once in two days to once a week and 42% elephants were bathed within their enclosure. Bathing materials used as scrub were: coconut husk, pieces of concrete, ceramic stones. M-R was 3 with a deviation of 63% from E-R.

Interaction among elephants was dependent on presence of other elephants with a single owner: during off-season interaction was unlimited with owners having more than one elephant; while working, elephants were subject to work schedule.

Mean number of elephants maintained during off-season, per owner, was 3 (ranging from 1-10), 68% owners maintained only male elephants (N= 19); while working, the number of elephants per festival/ program, was varied. Mean duration of interaction was 9.5h (ranging from 0-24h); 56% of the elephants were allowed less than 10h of interaction. M-R was 5 with a deviation of 39% from E-R.

All elephants were chained using a plain type chain. Chaining duration ranged from 18 – 24 hrs during off-season. Eight percent of the elephants were allowed to free range; none of the observed elephants was allowed to free range at night. M-R was 0.9 showing a deviation of 88% from E-R.

Sixty seven percent of the elephants were described as quiet/ reliable. Of the three female elephants, a 35 yrs old elephant was reported to be aggressive towards mahouts/ strangers and other animals. Twenty seven percent of the elephants were reported to exhibit stereotypic behaviours such as head/ body swaying of medium to low intensity. M-R was 6 indicating a deviation of 31% from E-R.

Fifty one percent of elephants were used for festival work, only 2% of the elephants were used for timber related work, remaining were used for both. Festival work type involved parades/ temple rituals/ processions.

Mean number of working days was 60 (ranging from 12- 315); working season was throughout the year from January-April/ February - March/ August - November/ August - April or May or October/ December - April or May.

Mean distance to working place was 100 km (ranging from 0 – 500 km). Mean distance to working place covered by foot was 39 km (ranging from 15-125 km). Mean distance to working place covered by vehicle was 228 km (ranging from 45-1000 km).

Remuneration per festival per elephant ranged from Rs.2000-3500/- and 70% of the elephants did not have access to shade while working. Twenty one percent of elephants did not have access to water; only 5% were not given rest and all were given food while working but with restricted time for consuming the food. M-R was 4 showing a deviation of 56% from E-R.

Only 7% of the elephants were given both stall feed and allowed to free range to forage. Food provided was: *Caryota* leaves, other palm leaves, sugarcane (*Sacharum* sp.), rice (*Oryza sativa* grains), Bananas (*Musa* sp.), Jaggery (sweet derived from sugarcane), *Erythrina* sp. leaves, grasses, ragi (*Eleusine coracana*).

Food provided during musth period was *Curd* rice (cooked rice grains with yoghurt), water-melon (*Citrullus lanatus*), cucumber (*Cucumis sativus*), Banana stems, *sago* (starch from *Metroxylon sagu*), Rice flakes with banana

Rice with turmeric (cooked rice grains with turmeric— *Curcuma longa* powder)/ rice flakes with curry leaves (*Muraya koenigii*) was given for timber work; ayurvedic powders, dates (*Phoenix dactylifera)*, banana, rice flakes was given for rejuvenation. M-R was 1.4 (SE= 0.9, N*= 6) showing a deviation of 83% from E-R.

The occurrence of oestrus cycles among the three female elephants was not known. Physical contact with male elephants was not allowed. 14% of adult male elephants were not exhibiting musth signs.

Chaining and watering of musth elephants was practiced. 60% of the elephants had exhibited signs of aggression towards people/ other animals while in musth. Fifty three percent of the elephants had not sired offspring (N= 19), status was not known for the rest. M-R was 4 showing a deviation of 57% from E-R.

Four elephants, all aged 40-43y, were reported to be blind in one eye. Among these, a 40 yrs old elephant was blind in both eyes. Ten elephants had foot related injuries: leg wounds/ toe nail cracks. Kidney problems/ impaction/ tusk infection were the other health issues recorded. One elephants had a broken tail bone after being hit by a vehicle

Samples of blood/ urine/ dung were not tested for any of the elephants. Body measurements were taken for only 33% of the elephants. M-R was 3 indicating a deviation of 68% from E-R.

All elephants had access to a veterinary doctor, years of experience ranged from 5- 35 yrs. Frequency of visits was on call. Distance from elephant location to doctor's place ranged from 10- 200 km. M-R was 6 showing a deviation of 26% from E-R.

Mean experience for elephant handlers in this profession was 19 yrs ranging from 1-35 yrs. Mean experience with a specific elephant was 4.1 yrs, ranging from two months to 24 yrs. Ninety percent of handlers opted for this profession out of interest. M-R was 6 implying a deviation of 26% from E-R.

Sixty seven percent of handlers' family occupation was not related to handling elephants— *coolie* (laborer)/ agriculture was the family occupation. Mean annual salary was Rs. 43,000/- ranging from Rs. 14,000 to 80,000/- and only 25% of handlers were covered by insurance.
All handlers used tools to control their elephant: Wooden ankush with metal spike, stick, stick with an iron nut around, long pole (*valiyakol*). Mean number of elephants each handler had worked with was 7.0 (ranging from 2- 35). Fifty percent of the handlers consumed alcohol, after work / on alternate days/weekly/occasionally. M-R was 4 indicating a deviation of 47% from E-R.

Introduction

Maintenance of a large number of captive elephants by single owners, in Kerala, became rare following the ban of timber extraction from forests and consequent absence of work in the timber industry (Lair, 1997, citing other authors). Also, elephants traditionally owned by big landlords appear to have changed to individual ownership along with a shift in predominant work type from timber to use in festivals (*op. cit.*). A study of captive elephants in Kerala found maximum ownership of captive elephants by private individuals (72%), with an owner to elephant ratio of 1:1.5 (Easwaran, Pers. Comm). Economic considerations among owners may impose restrictions on the way elephants are maintained, keeping in mind the cost of maintaining the animal along with its handler/s.

Objective

Living conditions provided for elephants in captivity may vary with each owner, dependent upon constraints and priorities of the owner. Handlers, who are integral to the maintenance and care of such elephants, are also dependent on the conditions existing in their work-place; poor economic status/ lack of professional experience may affect motivation levels, expertise or interfere with handler-elephant relationship. This report aims to:

- Assess the physical, biological and veterinary features provided to elephants in captivity
- Assess the professional experience and socio-economic status of handlers (mahouts/ cawadis)

Method

Elephants have been maintained in captivity for thousands of years, yet have never been selectively bred for specific traits suitable for captive conditions. Thus, the ecological and behavioural needs of captive elephants are on par with those of their wild counterparts. Absence of features (biotic and abiotic) experienced in the wild may cause stress and poor welfare for captive elephants.

The welfare status of elephants has been rated based on the deviation experienced in captivity: the greater the deviation, the lesser the rating and poorer the welfare of the elephants.

The rating method

A team of experts, from wildlife biologists to welfare activists, rated different parameters of importance to the welfare of captive elephants (Varma, 2008; Varma, et al., 2008; Varma and Prasad, 2008). This rating was then used to assess the welfare status of elephants and mahouts/ cawadis.

- Experts from different fields rated a total of 114 welfare parameters covering all the major aspects of captivity
- The rating scale was from zero (unsuitable conditions) to ten (suitable conditions). Experts used different maxima based on their concept of importance of a particular parameter to an elephant. A mean rating for each parameter, across all the participating experts, has been used as the Experts' Rating (E-R) which represents the

importance attached to a parameter i.e., for a parameter with 8.0 as the maximum value, only 2.0 (25%) deviation from the prescribed norm is considered acceptable.

- Using the maxima given by experts as a base, a rating scale, starting from zero to the particular maximum value for that parameter, has been used to rate the welfare status in this report. This forms the Mean rating (M-R) denoting welfare status of existing conditions for the particular parameter.
- The experts rated 114 different parameters. In this report, variables which represent a common feature of the captive situation have been grouped to form a parameter. The variables have been termed sub-parameters. For example: the variables, shelter type, shelter size, floor type in the shelter represent different aspects of the physical space provided to the elephant. Hence these are grouped together to form the parameter "Shelter" and each constituent variable is the sub-parameter. In this report, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters.
- M-R for a particular parameter (say, shelter) has been obtained by averaging the rating given for each sub-parameter. The rating for each sub-parameter is based on the existing conditions for the elephants.
- Graphs have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the sub-parameters observed. The difference between E-R and M-R (expressed as percentage) indicates the extent of deviation from the acceptable standards as suggested by experts.
- N* refers to number of sub-parameters for an observed parameter. N refers to the total number of parameters/sub-parameters observed.
- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) have been used to indicate the professional/ socio-economic status, of value to the handler and his elephant.

Results

Twenty five owners maintained 44 elephants (41 males, 3 females); number of elephants per owner ranged from 1- 11, most owners (N= 17) maintaining one elephant only. Age of males ranged from 5-60, female age ranged from 27-40 (Figure 1).

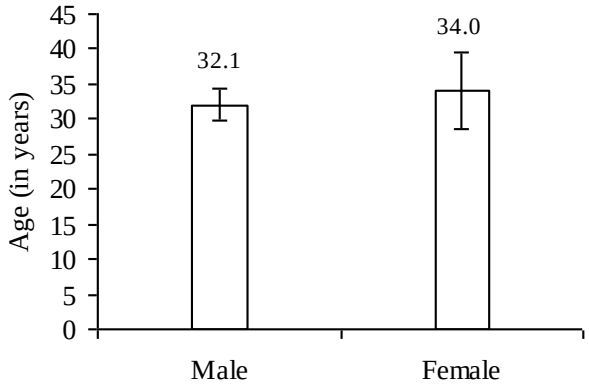


Figure 1: Mean age of elephants with private owners

Source
Shifting elephants across managements implies change in living conditions for the animals with different daily routines to be learnt and performed with possible change in handlers also. This can be a source of stress for the animals.

- All elephants were purchased from different sources, across six states: Kerala, Bihar, Assam, Karnataka, Uttar Pradesh and Andaman.
- Most elephants were purchased from Kerala (12) followed by Bihar (11); sourcing of elephants from Kerala may also include those elephants originally acquired from other regions, but having been sold/ gifted across owners within Kerala.

M-R was 1.5 (SE= 0.0, N= 43) showing a deviation of 75% from E-R.

Purpose
Keeping elephants for income generation will involve a conflict in priorities for the owner: income generated from the work preformed versus opportunity for the elephant to express its species-typical behaviours in a natural environment. Thus, commercial use of elephants has been given low rating.

- All elephants were maintained for use in festivals/ processions/ religious functions

M-R was 0.3 (SE= 0.1, N= 39) indicating a deviation of 96% from E-R.

Shelter
The physical space inhabited by wild elephants is vast, ranging from 250-1000km^2 (Sukumar, 2006), considering the distances traversed by them in search of food/ mates. Captive spaces are restricted, characterized by absence of vegetation and/ or restraining elephants by chaining.

- 69% of elephants were kept in open type of shelters exposing the elephants to summer heat/ monsoon rain; a shed was provided for some
- Of the elephants, only 7% had concrete flooring for one half of a day; the rest had earthen floors
- The elephants spent an average of 19h (ranging from10- 24h) within this space during off-season (when not working); mean hours outside shelter was 6h (ranging from 0 – 24) either for work or for bathing/ bringing fodder. One male elephant (42.5y) was used for work in neighboring states and kept in the shelter with owner from January to April.
- 10% of the elephants (N= 42) did not have access to shade; shade type ranged from roofed shed to partial tree cover
- Shelter was cleaned one of three to three times a day for dung/ urine removal

M-R was 4.3 (SE= 1.5, N*= 7) implying a deviation of 47% from E-R. Figure 2 and 3 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

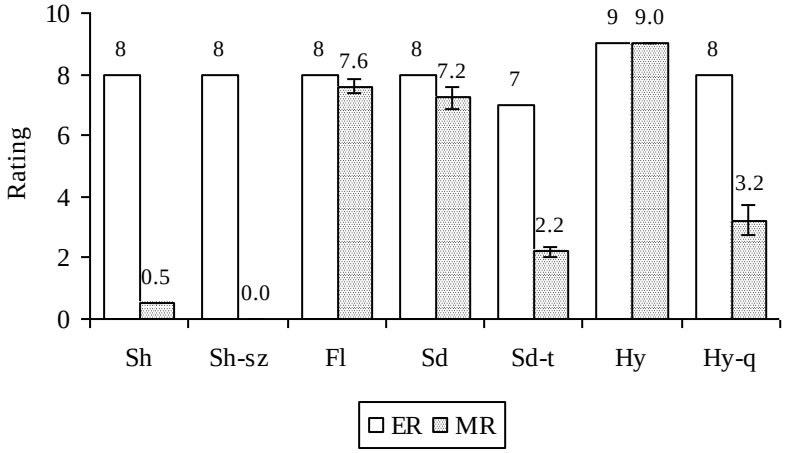
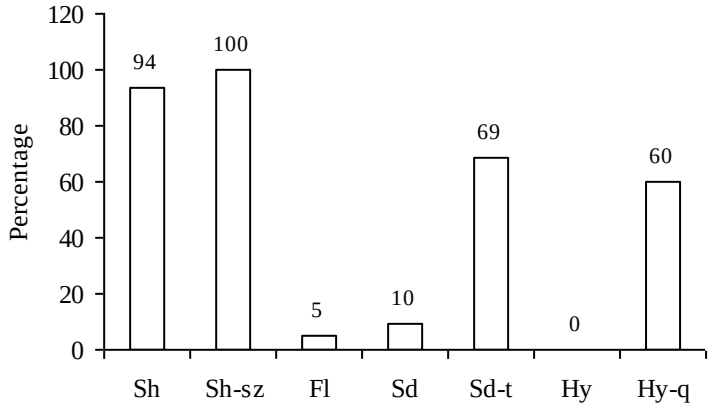


Figure 2: Comparison of E-R and M-R for 'shelter' sub-parameters



Sh: Shelter type Sh-sz: Shelter size Fl: Floor Sd: Shade availability Sd-t: Shade type
Hy: Maintenance of hygiene Hy-q: Quality of hygiene maintenance

Figure 3: Percentage wise deviation from E-R for 'shelter' sub-parameters

Water

Elephants may consume 200-250L of water/ day (Cheeran, 2009), wild elephants have been observed to spray water/ mud on their body or bathe. Hot weather conditions prevailing in a region and restricted movement of captive elephants make the provision of water an important feature for maintenance of health and well-being.

- 95% of the elephants were provided with water from bore well/ open well/ tap water (N= 42), including those which provided more than one source of water. 62% owners provided more than one source of water. 48% elephants had access to rivers/ streams/ canals as a source of water
- Distance to water source ranged from within the enclosure to 3-4kms
- Number of times allowed to drink water varied from twice to 4-5 times/ day
- Water quality analysis was not done by any of the owners

- Bath frequency varied from daily or once in two days to once a week
- 42% (N= 36) elephants were bathed within their enclosure
- Mean bath duration was 2.6h (ranging from 1-4h)
- Bathing materials used as scrub were: coconut husk, pieces of concrete, ceramic stones

M-R was 3.0 (SE= 1.0, N*= 5) with a deviation of 63% from E-R. Figures 4 and 5 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

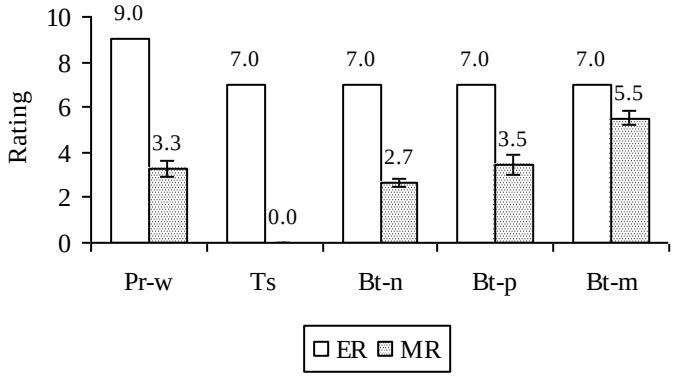
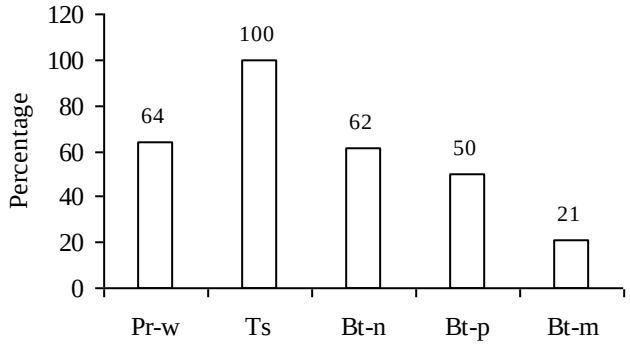


Figure 4: Comparison of E-R and M-R for 'water' sub-parameters



Pr-w: Availability of perennial source of running water Ts: Water quality tests Bt-n: Number of times bathed
Bt-p: Bathing place Bt-m: Bathing materials

Figure 5: Percentage wise deviation from E-R for 'water' sub-parameters

Sleep

Elephants have been observed to sleep for a period of 3-4h at night (Kurt and Garai, 2007). Sleep duration that is greater/ lesser than this period may indicate abnormality or absence of activity for the elephant to keep itself occupied. Physical conditions of the sleep area, if unsuitable, can have health consequences.

- Sleeping area was the shelter during off-season/ various places while working
- Size of sleeping area was the same as the shelter during off-season (0.000009-0.0000372 km^2)

- Mean sleep duration off-season was 5.6h (ranging from 3.5-9h); while working mean sleep duration was 4.8h (ranging from 3.5-6h)
- The elephants rested for a mean duration of 10.6h (ranging from 3-24h) during off-season; while working this duration was 5.3h (ranging from 3-8h)

M-R was 1.5 (SE= 1.5, N*= 3) with a deviation of 81% from E-R. Figures 6 and 7 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

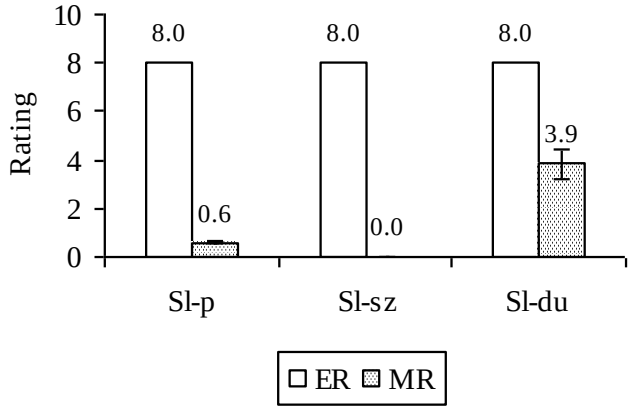
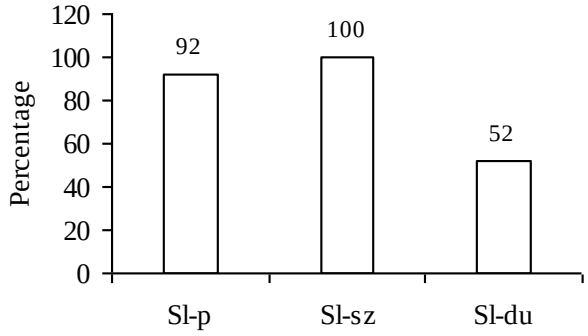


Figure 6: Comparison of E-R and M-R for 'water' sub-parameters



Sl-p: Sleeping place Sl-sz: Sleep area (size) Sl-du: Sleep duration

Figure 7: Percentage wise deviation from E-R for 'water' sub-parameters

Walk

Elephants have been observed to traverse several kilometers a day (Poole and Granli, 2009), with males in musth covering greater distances than when in non-musth (Fernando et al., 2008). This implies the necessity for elephants to be given the opportunity to walk on suitable surfaces.

- 15% (N= 40) elephants were not given an opportunity to walk (includes one male which was walked during work only)

- Distance covered while walking varied from 2-3km (off-season) to 25-30kms (work)
- Time of walking was at various times of the day/ night with nature of terrain varying from slopes to tar roads
- Mean walk duration was 2.4h (ranging from 0.5-6h)

M-R was 3.5 (SE= 2.6, N*= 3) showing a deviation of 61% from E-R. Figures 8 and 9 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

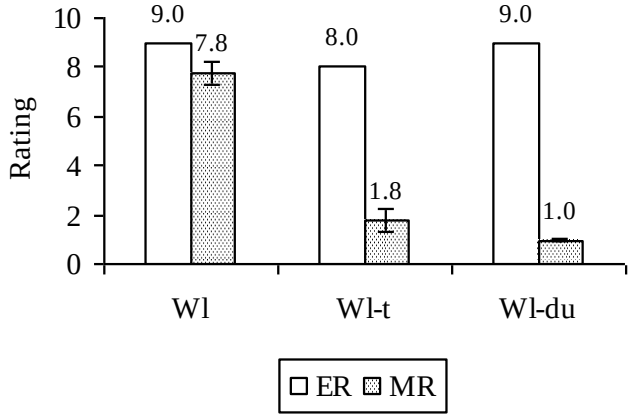
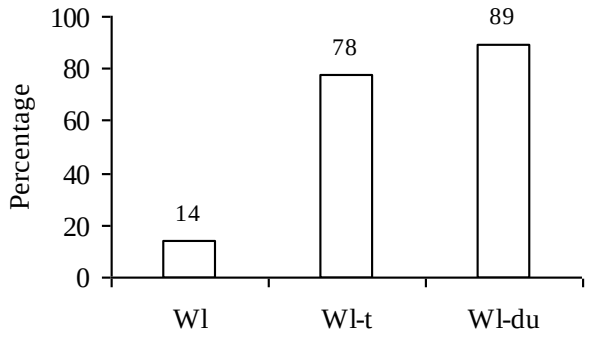


Figure 8: Comparison of E-R and M-R for 'walk' sub-parameters



Wl: Opportunity to walk Wl-t: Time of walk Wl-du: Walking duration

Figure 9: Percentage wise deviation from E-R for 'walk' sub-parameters

Social interaction

Matriarchal society of elephants is a documented fact (Sukumar, 2006); males may form bachelor herds or wander alone (Poole and Granli, 2009); males have been observed in non-aggressive interactions in the wild (McKay, 1973). The presences of males in captivity need not imply absence of interaction with other elephants.

- 2.4% of the elephants were not allowed social interaction (N= 42)
- Mean duration of interaction was 9.5h (ranging from 0-24h); 56% of the elephants allowed less than 10h of interaction

- Interaction was dependent on presence of other elephants with a single owner: during off-season, interaction was unlimited with owners having more than one elephant; while working, elephants were subject to work schedule
- Mean number of elephants maintained during off-season, per owner, was 3 (ranging from 1-10), 68% owners maintained only male elephants (N= 19); while working, the number of elephants per festival/ program, was varied

M-R was 4.9 (SE= 1.7, N*= 4) with a deviation of 39% from E-R. Figures 10 and 11 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

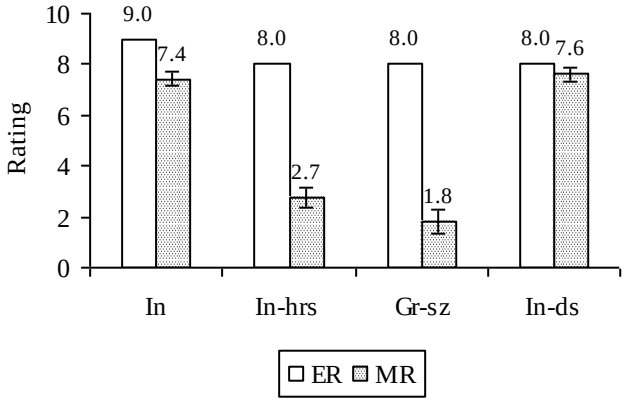
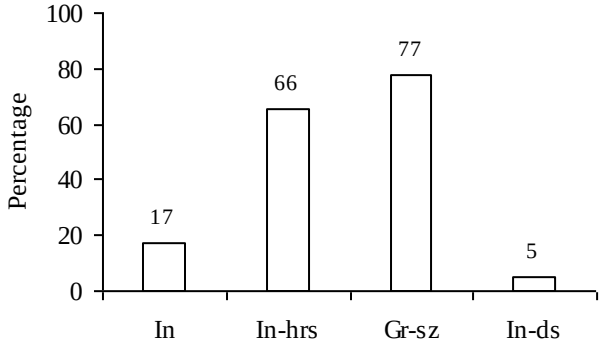


Figure 10: Comparison of E-R and M-R for 'interaction' sub-parameters



In: Opportunity for social interaction In-hrs: Interaction hours Gr-sz: Group size
In-ds: Interaction distance (between elephants)

Figure 11: Percentage wise deviation from E-R for 'interaction' sub-parameters

Chaining

Movement of elephants in captivity is restricted by the use of chains of various kinds on different parts of the animal's body. This practice of chaining has consequences on the welfare of the elephant through its ability to restrict/ prevent expression of species-typical behaviours.

- All elephants were chained using a plain type chain; 69% (N= 39) were chained by the leg, body and hobbled by their feet. Figure 12 gives the dimensions of each chain type
- Chaining duration ranged from 18 – 24h during off-season; only one elephant was chained for only 2-3h during off-season; chaining duration while working varied from 2-15h
- 8% of the elephants (N= 24) was allowed to free range; none of the observed elephants was allowed to free range at night

M-R was 0.9 (SE= 0.9, N*= 5) showing a deviation of 88% from E-R. Figures 13 and 14 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

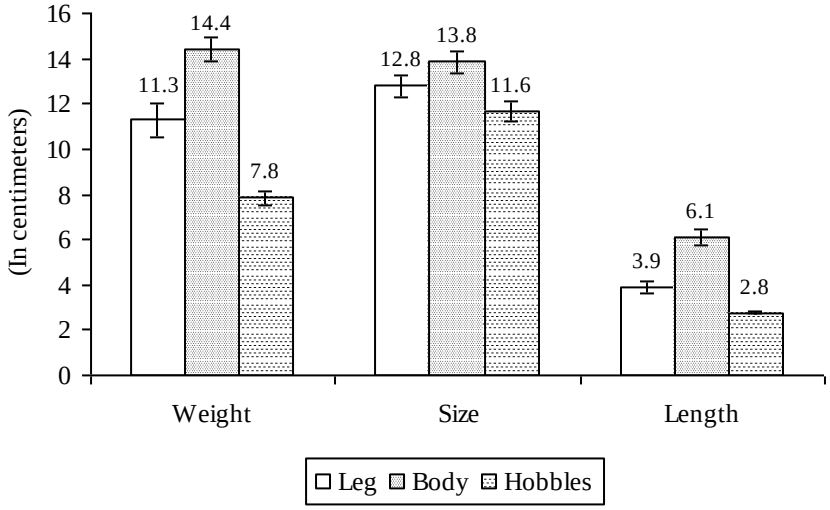


Figure 12: Dimensions of chain types

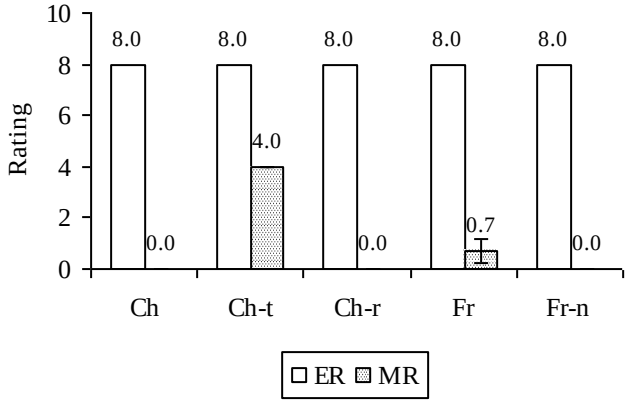
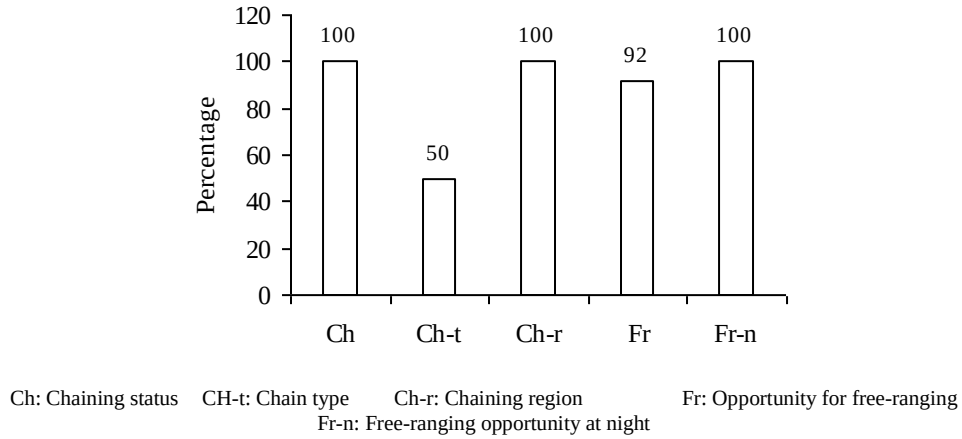


Figure 13: Comparison of E-R and M-R for ‘chaining’ sub-parameters



Ch: Chaining status CH-t: Chain type Ch-r: Chaining region Fr: Opportunity for free-ranging
Fr-n: Free-ranging opportunity at night

Figure 14: Percentage wise deviation from E-R for 'chaining' sub-parameters

Observed behaviour

The temperament of captive elephants is an important feature vis-à-vis the husbandry practices adopted; it is also an interlinked feature of the management practice adopted. The occurrence of stereotypy among the elephants can be considered to be indicative of poor welfare conditions (Gruber, et al., 2000).

- 67% of the elephants (N= 39) were described as quiet/ reliable
- Of the three female elephants, a 35y old elephant was reported to be aggressive towards mahouts/ strangers and other animals
- 27% of the elephants (N= 33) were reported to exhibit stereotypic behaviours such as head/ body swaying of medium to low intensity

M-R was 5.5 (SE= 0.4, N*= 3) indicating a deviation of 31% from E-R. Figures 15 and 16 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

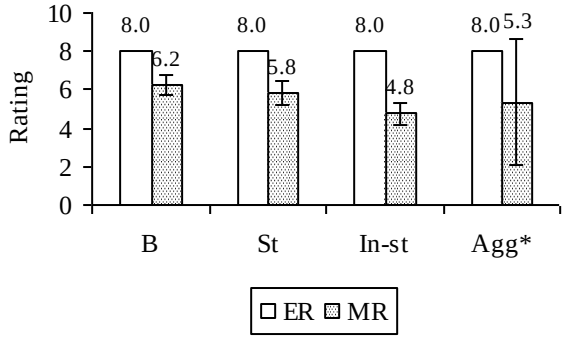
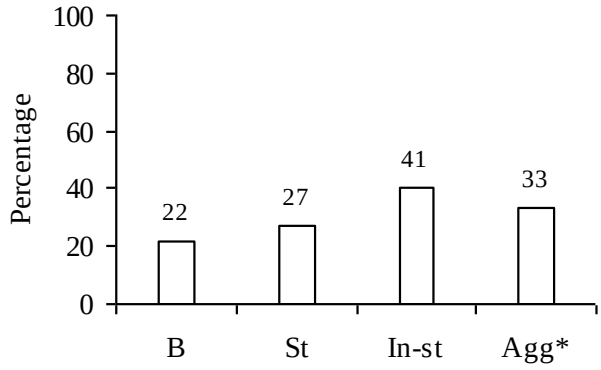


Figure 15: Comparison of E-R and M-R for 'behaviour' sub-parameters



B: Observed behaviour St: Occurrence of stereotypy In-st: Intensity of stereotypy
Agg: Occurrence of aggression
*: Expression of aggression during non-musth; recorded for female elephants only

Figure 16: Percentage wise deviation from E-R for 'behaviour' sub-parameters

Work

Captive elephants are used for work that is dictated by human goals; this maybe alien to the elephants' natural behavioural repertoire. Existing weather conditions at the workplace and provision of suitable remedies, such as shade/ water, are equally important for maintaining the elephant's well-being.

- 2% of the elephants (N= 41) were used for timber related work, 51% were used for festival work only, remaining were used for both; Festival work type involved parades/ temple rituals/ processions. Table-1 gives mean values of work conditions for the elephants
- Mean number of working days was 60 (ranging from 12- 315); working season was throughout the year from January-April/ February - March/ August - November/ August - April or May or October/ December - April or May
- Festival timings
    - 9a.m. – 12 noon
    - 2p.m. – 4p.m. / 2p.m. – 6p.m.
    - 3p.m. – 6p.m./ 4p.m. – 6p.m./ 4p.m. – 7p.m./ 4p.m. – 9p.m./ 5p.m. – 9p.m
    - 9p.m. – 6a.m./ 12a.m. – 5a.m.
- Tourism work timings
    - 7a.m. - 10a.m./ 11a.m.
    - 3p.m. - 5p.m.
- Timber work timings
    - 8a.m. – 10a.m./ 12 noon
    - 10:30a.m. – 1p.m.
    - 2p.m. – 4p.m/ 5p.m.
- Mean distance to work place was 100kms (ranging from 0 – 500kms)
- Mean distance to work place covered by foot was 39kms (ranging from 15-125km)
- Mean distance to work place covered by vehicle was 228kms (ranging from 45-1000kms)

- Remuneration per festival ranged from Rs.2000-3500/-
- 70% of the elephants did not have access to shade while working (N= 36); 21% (N= 39) did not have access to water; 5% (N= 39) were not given rest and all were given food while working, but duration for feeding was restricted and did not provide enough time for consumption of food by the elephants

M-R was 3.5 (SE= 1.2, N*= 8) showing a deviation of 56% from E-R. Figure 17 and 18 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

Table 1: Work condition for elephants

	Standing duration/day (hrs)	**Standing duration/night (hrs)**	**Maximum weight carried (kg)**	**Maximum Distance covered with weight (km)**	**No. of festivals attended which pay > Rs. 5000/ day**
Mean	4.0	3.5	168.9	1.9	7.0
SE	0.2	0.2	4.6	0.2	1.1

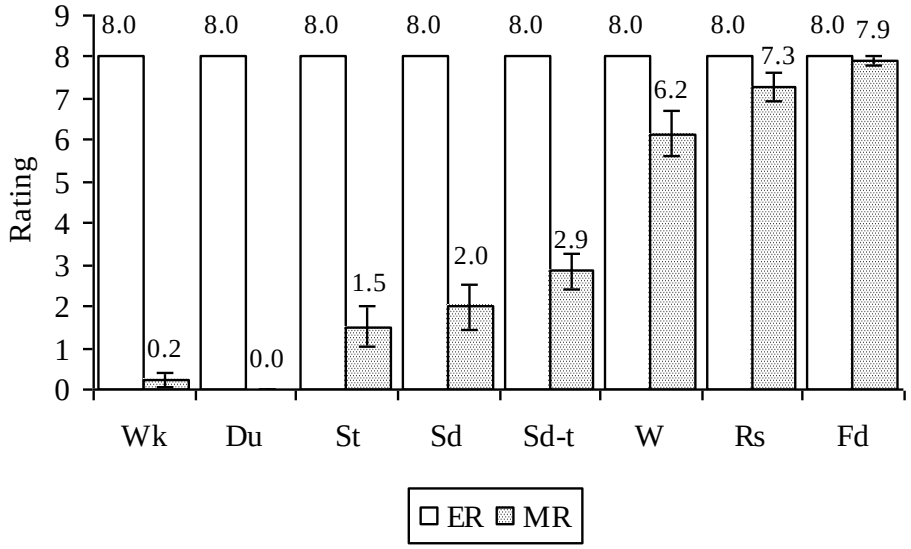


Figure 17: Comparison of E-R and M-R for 'work' sub-parameters

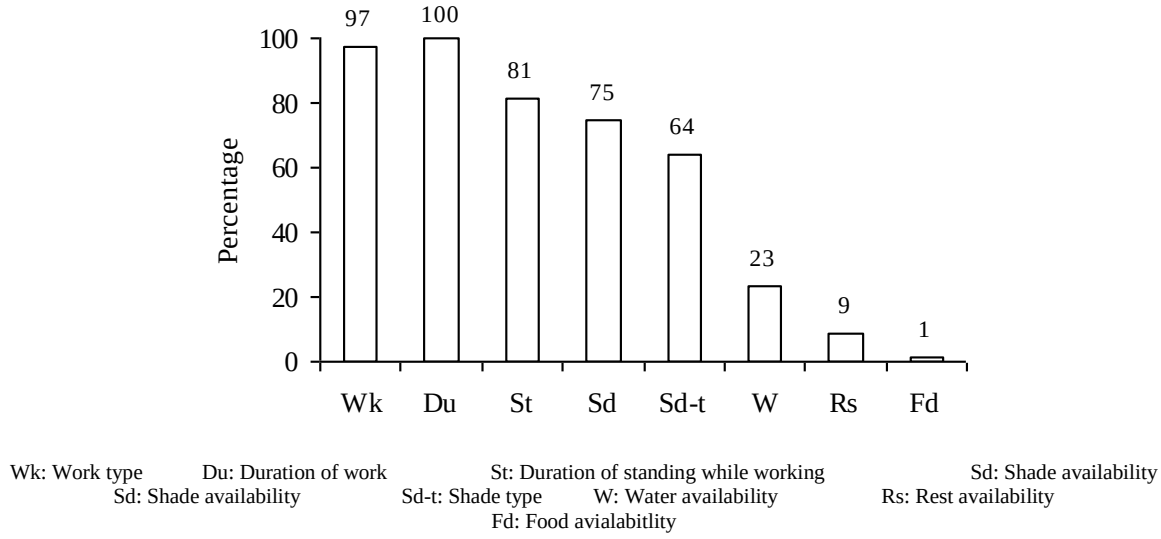


Figure 18: Percentage wise deviation from E-R for 'work' sub-parameters

Food

In the absence of free-ranging opportunity, food available to elephants is limited to what is given by people. In contrast, wild elephants feed on a wide variety of plants, manipulating vegetation to enable feeding (Kurt and Garai, 2007).

- Only 7% of the elephants (N=42) were given both stall feed and allowed to free range to forage
- Feeding duration ranged from 2-3hrs to 10hrs, depending on work type; off-season duration ranged from 7-10hrs.
- Site of feeding was the shelter / work place; 68% of the feeding sites (at enclosure/ shelter) were described as poor-average
- Food provided was: *Caryota* leaves, other palm leaves, sugarcane (*Sacharum* sp.), rice (*Oryza sativa* grains), Bananas (*Musa* sp.), Jaggery (sweet derived from sugarcane), *Erythrina* sp. leaves, grasses, ragi (*Eleusine coracana*)
- Food provided during musth period was *Curd* rice (cooked rice grains with yoghurt), water-melon (*Citrullus lanatus*), cucumber (*Cucumis sativus*), Banana stems, *sago* (starch from *Metroxylon sagu*), Rice flakes with banan
- Rice with turmeric (cooked rice grains with turmeric— *Curcuma longa* powder)/ rice flakes with curry leaves (*Muraya koenigii*) was given for timber work; ayurvedic powders, dates (*Phoenix dactylifera),* banana, rice flakes, meat, eggs, *ghee* (clarified butter), *Gingelly* (Sesame) oil, jaggery were given for rejuvenation
- 91% of the elephants were not given straw as food
- Mineral mix was not given for any of the observed elephants
- Except one place, ration charts were not used

M-R was 1.4 (SE= 0.9, N*= 6) showing a deviation of 83% from E-R. Figures 19 and 20 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

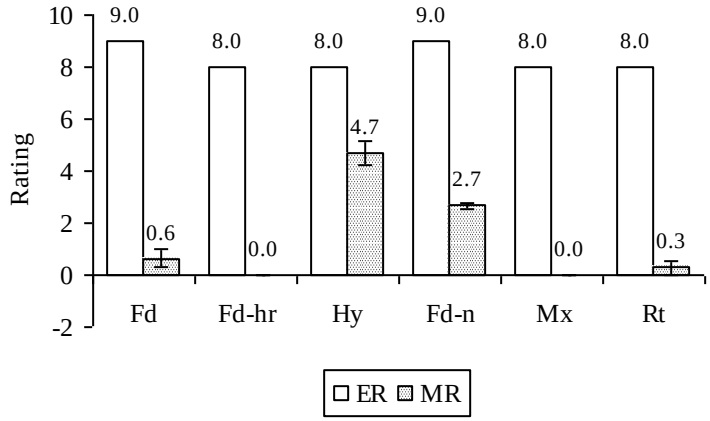
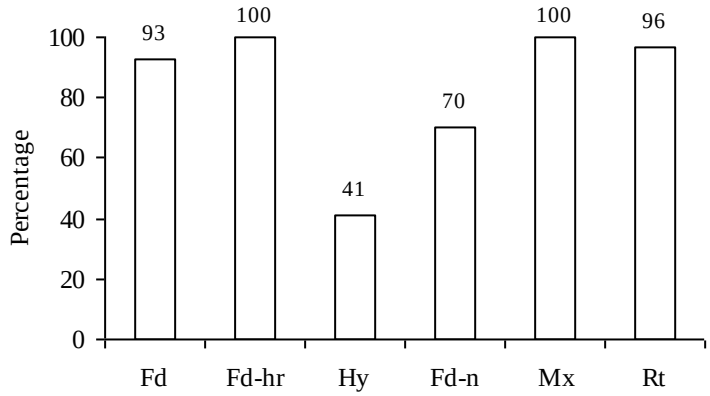


Figure 19: Comparison of E-R and M-R for 'food' sub-parameters



Fd: Food provisioning type Fd-fr: Feeding hours (duration) Hy: Hygiene of feeding place
Fd-n: Number of food items Mx: Mineral mix Rt: Ration chart usage

Figure 20: Percentage wise deviation from E-R for 'food' sub-parameters

Reproductive status

Male elephants cover greater distances while in musth (Fernando, et al., 2008), in search of mates. The presence of more number of male elephants and the incidence of musth pose a problem in managing the elephants without reducing their welfare.

- The occurrence of oestrus cycles among the three female elephants was not known
- Physical contact with male elephants was not allowed
- 14% of adult male elephants were not exhibiting musth signs (N=21)
- Time of musth ranged from January to December with elephants coming to musth in different months
- Chaining and watering of musth elephants was practiced
- 60% of the elephants had exhibited signs of aggression towards people/ other animals while in musth (N= 25)
- 21% of the elephants (N= 24) were not exposed to females

- 53% of the elephants had not sired offspring (N= 19), status was not known for the rest

M-R was 3.5 (SE= 1.5, N*= 5) showing a deviation of 57% from E-R. Figures 21 and 22 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

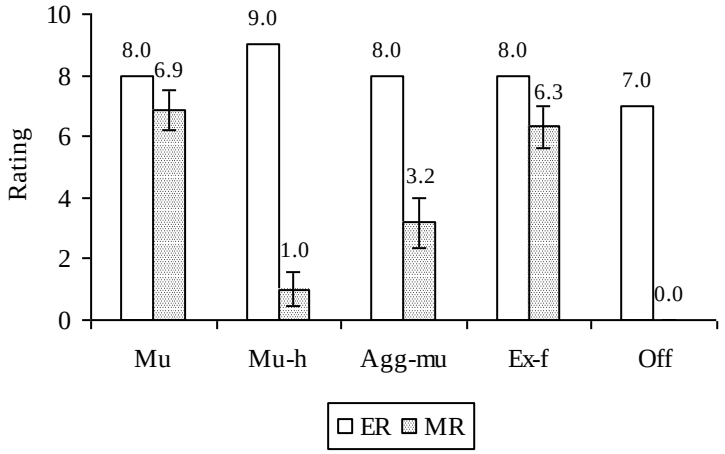
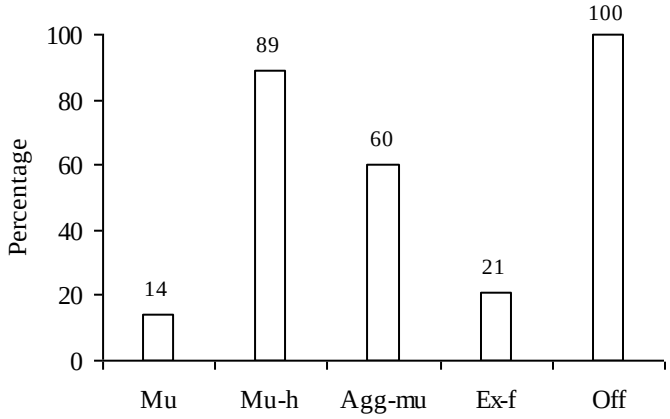


Figure 21: Comparison of E-R and M-R for 'male reproductive status' sub-parameters



Mu: Occurrence of musth Mu-h: Handling of musth Agg-mu: Aggression during musth
Ex-f: Exposure to females Off: Offspring sired

Figure 22: Percentage wise deviation from E-R for 'male reproductive status' sub-parameters

Health status

Poor living conditions such as unsuitable substrates/ unhygienic conditions/ physical exertion /psychological stress may lead to ill-health. Maintenance of a prescribed veterinary schedule is essential for the health of the elephants.

- Four elephants, aged 40-43y, were reported to be blind in one eye. Among these, a 40y old elephant was blind in both eyes
- Ten elephants had foot related injuries: leg wounds/ toe nail cracks

- Kidney problems/ impaction/ tusk infection, parasitic infestation were the other health issues recorded
- One elephants had a broken tail bone after being hit by a vehicle
- Deworming was done for 47% of the elephants (N= 32); the practice was regular for all except one elephant
- Immunization was not done for any of the elephants (N= 33)
- Application of oil on the body was not done for any of the elephants (N= 32)
- Samples of blood/ urine/ dung was not tested for any of the elephants (N= 34)
- Body measurements were taken for only 33% of the elephants (N= 33)

M-R was 2.6 (SE= 1.1, N*= 7) indicating a deviation of 68% from E-R. Figures 23 and 24 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

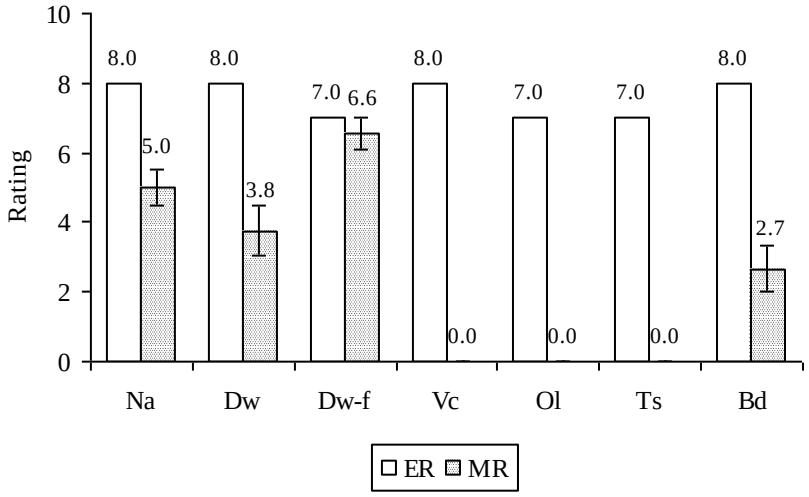


Figure 23: Comparison of E-R and M-R for 'health status' sub-parameters

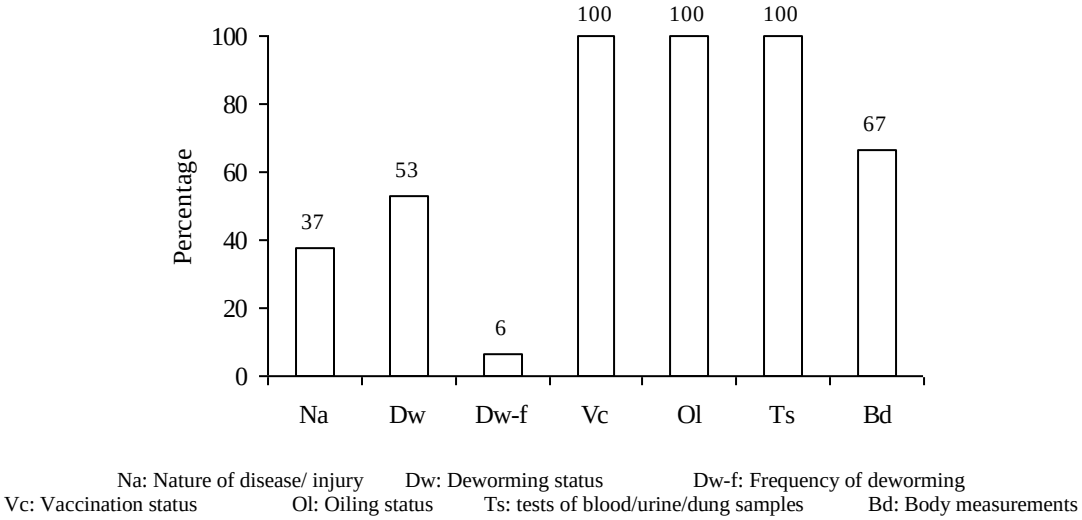


Figure 24: Percentage wise deviation from E-R for 'health status' sub-parameters

Veterinary personnel and infrastructure

Access to veterinary care and other infrastructure such as accommodation for handlers/ rooms for cooking/ storage/ veterinary dispensary unit, etc., in a captive situation will ensure effective administration.

- All elephants had access to a veterinary doctor, years of experience ranged from 5-35y.
- Frequency of visits: on call
- Distance from elephant location to doctor's place ranged from 10- 200kms
- Veterinary assistant was not available for 14% of the elephants (N= 28)
- Number of facilities available ranged from one – five; veterinary clinic facility was available for 70% of the elephants (N= 29)
- 70% handlers had access to accommodation (N= 36)
- Service/ clinical/ health records were not maintained for 14% of the elephants (N= 37)

M-R was 5.9 (SE= 0.9, N*= 7) showing a deviation of 26% from E-R. Figures 25 and 26 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

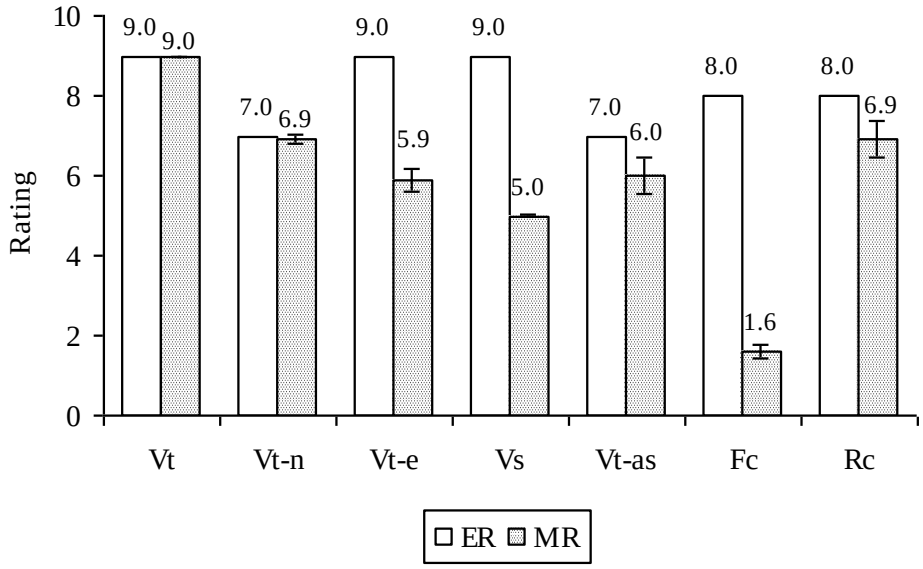
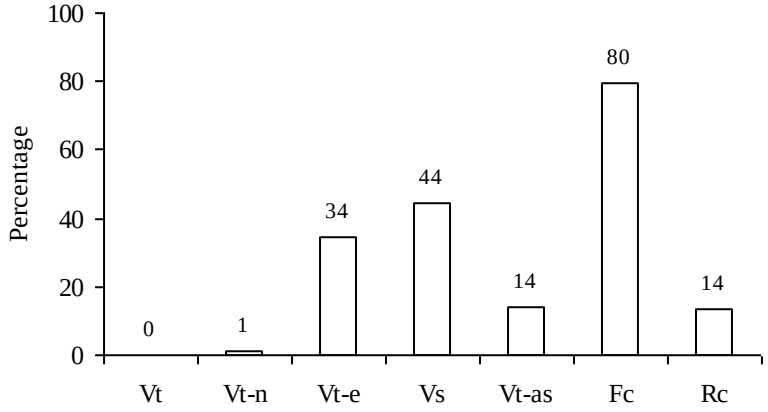


Figure 25: Comparison of E-R and M-R for 'veterinary personnel and infrastructure' sub-parameters



Vt: Availability of veterinary doctor Vt-n: Number of years of experience Vt-e: Experience with elephants
Vs: Frequency of visits Vt-as: Availability of veterinary assistant Fc: Number of facilities available
Rc: Maintenance of records

Figure 26: Percentage wise deviation from E-R for 'veterinary personnel and infrastructure' sub-parameters

Mahout/ cawadi professional experience and socio-economic status

Information was collected on 36 handlers, employed by private owners. Mean age was 38.2y (SE= 2.8, N= 23) ranging from 19- 61y. Handlers (mahouts/ cawadis) are integral to a captive elephant situation where unrestricted contact is maintained between man and animal. Thus, their professional knowledge and attitude is vital to maintaining safety of the animal/ people. Poor social security/ knowledge/motivation or economic mismanagement may lead to conflict in the way elephants are handled.

Professional experience

- Mean experience in this profession was 18.5y (SE= 2.2, N= 23) ranging from 1-35y
- Mean experience with a specific elephant was 4.1y (SE= 1.4, N= 22) ranging from 7 days to 24y; Figure 27 shows comparison between number of years of experience in this profession and experience with a specific elephant, correlation coefficient between these two variables was 0.4
- 90% handlers opted for this profession out of interest

M-R was 6.0 (SE= 1.5, N*= 3) implying a deviation of 26% from E-R. Figure 28 and 29 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

Figure 27: Comparison between professional experience (number of years) and years with specific elephant

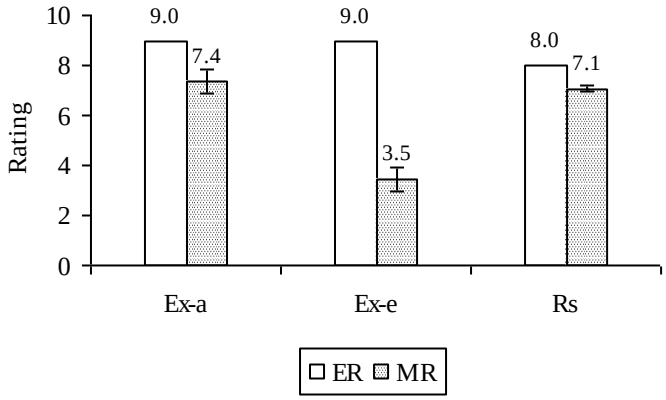
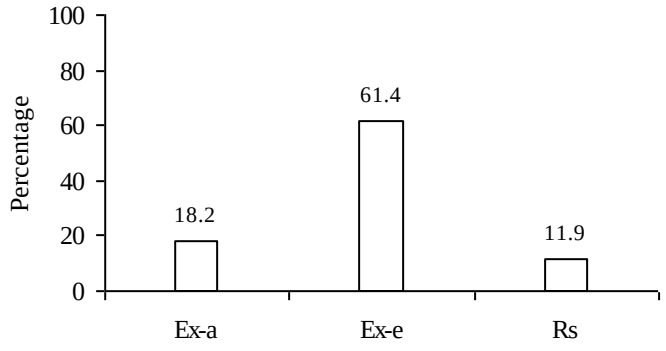


Figure 28: Comparison of E-R and M-R for handlers' professional experience



Ex-a: Experience (% of handlers' age) Ex-e: Experience (% of elephant's age) Rs: Reason for choosing this profession

Figure 29: Percentage wise deviation from E-R for handlers' professional experience

Socio-economic status

- 67% of handlers had relatives working in the same profession (N= 18)
- 67% of handlers' family occupation was not related to handling elephants— *coolie* (laborer)/ agriculture was the family occupation
- All handlers were literate (N= 20), with maximum schooling being 9th standard and minimum being 4th
- Mean annual salary was Rs. 43,000/- ranging from Rs. 14,000 to 80,000/-
- Number of children per family ranged from 1-3
- Maximum of three languages was known by the handlers
- Mean number of hours spent with elephant (off-season) was 7h (ranging from 4-19h); while working, mean number of hours spent was 16.4h (ranging from 9-21h)
- All handlers used tools to control their elephant: Wooden ankush with metal spike and pinhead, stick, stick with an iron nut around at one end
- Only 25% of handlers were covered by insurance (N= 20)
- Mean number of elephants each handler had worked with was 7.0 (ranging from 2-35); modal value was 3.0
- 50% handlers consumed alcohol (N= 18), after work / on alternate days / weekly / occasionally

M-R was 3.7 (SE= 0.6, N*= 9) indicating a deviation of 47% from E-R. Figures 30 and 31 give the rating and Percentage wise deviation respectively, for each of the sub-parameters.

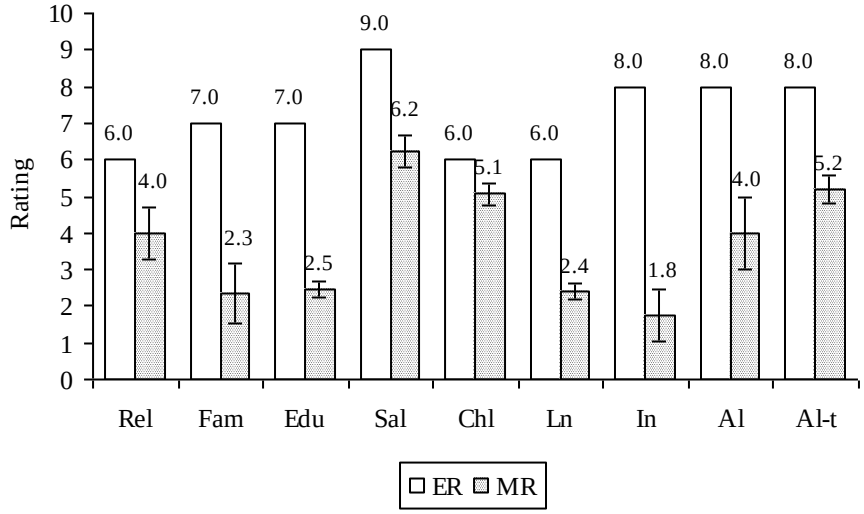


Figure 30: Comparison of E-R and M-R for 'handlers' socio-economic' status

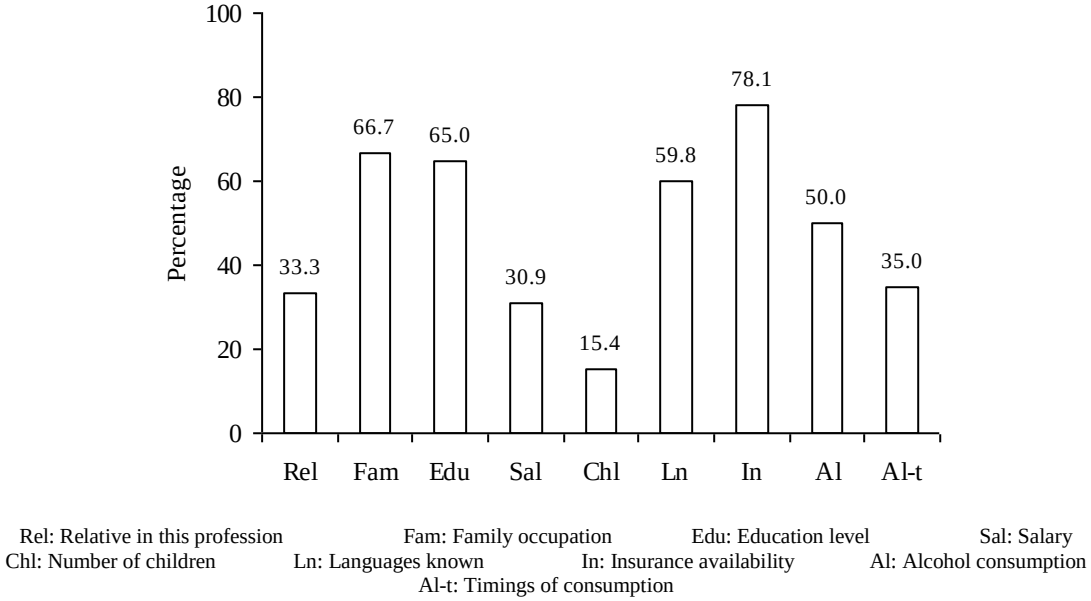


Figure 31: Percentage wise deviation from E-R for handlers' socio-economic status

Overall welfare status of elephants

Figure-32 shows 41 of the observed 66 parameters (62%) expressed deviation of 50% or more from E-R. These parameters were spread across all the observed features: physical/ social/ physiological and veterinary aspects implying poor overall condition.

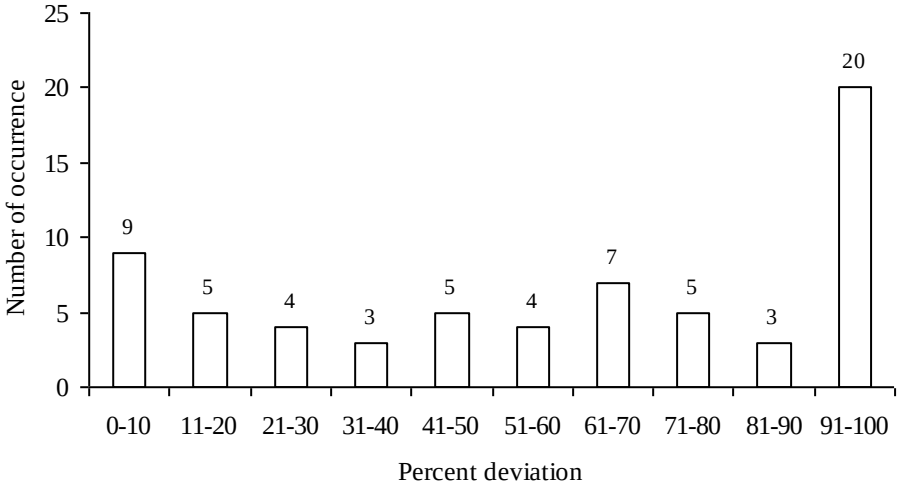


Figure 32: Distribution of Percentage wise deviation from E-R for observed parameters

Discussion

A characteristic feature of elephants with private owners was the predominance of males. Specific management practice, however, was limited to musth handling of males; all other husbandry methods being similar for males and the few females.

The need for space to forage/ engage in species-specific activity, use of naturally available resources such as mud/ water/ vegetation as ways of minimizing heat loss, expression of species-typical behaviors in appropriate context (reproductive/ social) are well documented (Poole and Granli, 2009; Sukumar, 2006).

Human dominance in all aspects of elephant life was observed for the elephants with private owners. Following aspects were evident:

- Confined space with little/ no opportunity to move or free range in natural conditions
- All encompassing nature of work schedule which decided husbandry methods for the elephants: opportunity to walk/ socialize/ rest/ drink water/ bathe were all decided by the work schedule
    - Shelter/ sleeping place was decided by the location of work; Work schedule implied continuous exposure to other elephants with two consequences:
        a. Breakage of established bonds with elephants belonging to the same owner
        b. Introduction of new elephants with potential for conflict among elephants without any recourse to express species-typical behaviour of fight/ flight
        c. Presence of unknown musth elephants
    - Elephants were worked throughout the day either for timber or festivals or a combination of both. Saseendran et al., (2009) report on the effects of using elephants for timber hauling, noting change in body temperature, pulse and respiration rate which increased with increasing duration and amount of work. Use of unsuitable dragging materials such as nylon ropes to haul logs is said to damage the jaw or mouth parts (early wear and tear of teeth) of the elephant (Ponnappan, 1998).
    - Traveling to different locations as part of work involved covering long distances either by walk or vehicles. One elephant had even been hit by a vehicle, damaging its tail bone
    - Imposition of unnatural behaviour while working such as standing still for long hours, in close proximity to unknown elephants or female elephants standing close to males, surrounded by loud noise of the crowd/ festivities, high temperature
- Absence of opportunity to forage in natural conditions as most (93%) were stall fed. Elephants are known to spend a major part of their activity in foraging (Poole and Granli, 2009)
- Male elephants are known to wander in search of mates (Fernando, 2009), musth state considered to be associated with expression of dominance (Venkataraman, unpublish.) as males compete to mate with females.
    - Male elephants in musth, with private owners, were all chained and isolated. The predominance of male elephants with private owners does not mean their presence in captivity without necessary social interaction with other elephants is acceptable. The development of an individual in the presence of herd members is considered crucial to its learning the strengths and weaknesses of others of the same sex (Poole and Granli, 2009). In addition, absence of members of the opposite sex during musth and concomitant chaining for the musth duration are totally contradictory to what the elephants need/ express.

    - Incidents of aggression during musth period was reported for most elephants
- The occurrence of vision loss among elephants of prime age was observed (all aged between 40-43y); immunization was not practiced; application of oil was not done; testing of dung/ urine/ blood samples was not done

Handlers' status:

- Irrespective of the number of years in this profession, experience with a specific elephant was low implying change of mahouts/ cawadis. Most handlers had worked with at least three elephants.
- Handlers did not report this as their family occupation. Despite the history of elephant keeping in Kerala, the presence of a new generation of handlers whose family occupation was not this profession implies recruitment of inexperienced people or absence of people with knowledge on elephants
- Insurance cover was not provided for most handlers
- No health check-ups were done for the mahouts/ cawadies

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Section 6:
Captive Elephant in Circus

Executive summary

The objective of the investigation was to assess the welfare status of an adult female elephant maintained by the Royal circus when it was performing at Trichur and Palghat districts in Kerala through evaluation of specific parameters relating to the animal and its keeper.

The elephant did not belong to this circus and was rented from a private owner based in Tamil Nadu since 5 years. Rating of 'source of animal' was 2.5 for the elephant indicating movement across facilities/management systems

Shelter for the animal was open type, close to the circus near a private bus terminus and the animal was tied with a 5 m chain. Overall rating for this parameter was 3.3.

The elephant had access to only tap-water provided through buckets and this was given a rating of 3.0.

The elephant performed in front of an audience as part of the circus act and, was also used to publicize for the circus. The elephant was walked only when taken for begging or when the animal was hired for other work. And rating for this parameter was 0.0.

The elephant was chained for most part of the day, hence, rating 0.0 was given.

Rating for provision of food was 0.0 for the elephant as it was given only stall feed.

The elephant was reported to have several instances of foot and gastro-intestinal diseases; the status of health was rated across seven sub-parameters and overall mean rating was 0.14.

There was also no provision of a veterinary assistant or veterinary care facility, both the parameters were given a rating of 0.0.

Overall mean rating, for the parameters considered, was 1.34. About 80 percent of values fell within the bad category, 10 % were considered poor and only 10% of the values could be considered satisfactory.

Introduction

Elephants in circuses in India constitute 2% of the captive population. However, the problems they face in terms of welfare and management is significant. The sole purpose of the elephants' existence in circuses is their ability to generate revenue. With this in mind, the welfare status in the way the animals are cared for, especially wild animals like elephants that have never been domesticated, assumes immense importance.

Objectives

The objective of the investigation was to assess the welfare status of the elephant maintained by the Royal circus when it was performing at Trichur and Palghat districts in Kerala through evaluation of specific parameters related to the animal and its keeper.

Methodos

Data for 30 parameters, representing the welfare status for a single, adult female elephant kept in this circus was collected by observation and interviews. As no data on mahout welfare was available, no parameter related to their welfare was considered to assess their welfare. Apart from a detailed investigation of the welfare aspects, each of the recommended parameters was rated on a scale of 0 – 10 with 10 representing living conditions closest to that of an elephant's natural environment and 0 representing bad conditions within that parameter.

Ratings were graded in the following manner:

- 0.0 to 2.4 – Bad
- 2.5 to 4.9 – Poor
- 5.0 to 7.4 – Moderate
- 7.5 to 10.0 – Satisfactory

Results

Source of elephant

The elephant did not belong to this circus. It was said to have been "rented" from a private owner based in Tamil Nadu since 5 years. Low ratings are given for animals that are purchased or gifted or loaned across owners as this might entail changes in the way the animal is handled and changes in the established social relationships (if any) among the animals. Rating was 2.5 for the elephant, indicating movement across facilities/ management systems.

Shelter

- Open type, close to the circus near a private bus terminus.
- The animal was tied with a 5 m chain.
- Floor type was mud and grass patches.
- No shade was available for the animal
- Condition of the tethering site was described as "bad"
- Sleeping\ resting place was within this space

Ratings were designed to reflect the natural conditions experienced by the elephants in the wild. Low values imply lack of the same. Overall rating was 3.3 (SE = 1.2, N* = 3), evaluated across three sub-parameters (Figure 1).

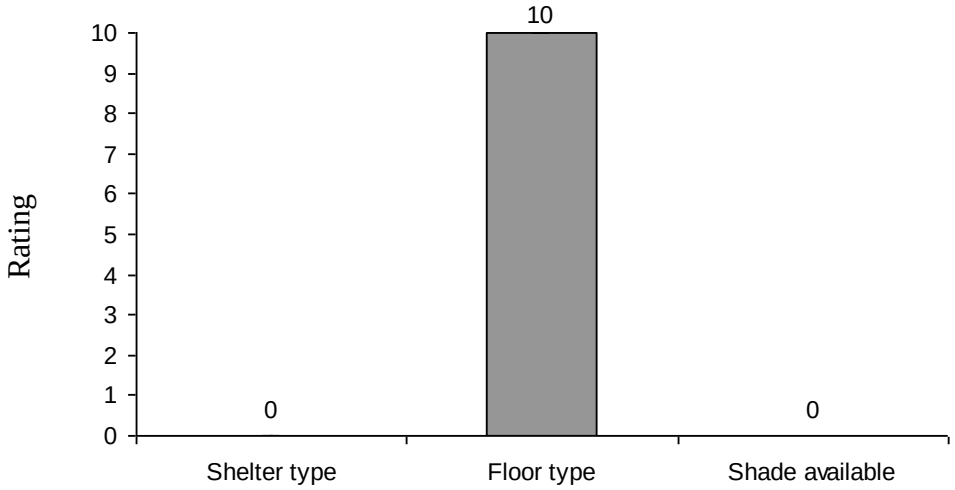


Figure 1: Ratings for 'shelter' sub-parameters

Rating was high as the animal had access to earthen flooring. The animal did not have access to shade. Hence, a rating of zero was given.

Water availability

The elephant had access to only tap-water provided to the animal through buckets. This was given a rating of 3.0, a value which reflects the inaccessibility of this kind of water source for the animal.

Sleeping place

The shelter/ enclosure also formed the sleeping place. Rating for 'sleeping place' was 1.0.

Opportunity for exercise

The elephant was not taken for walks. If it had an opportunity to walk, it was during the time when taken for begging or when the animal was hired for other work. Wild elephants are known to be active for almost 20 hrs/ day (Kane, et.al., 2002). In a captive environment, restricted movement limits the activity of the animal. Hence, opportunity provided specifically for walking was rated. Rating was 0.0.

Social interaction

No interaction as it the only elephant in the circus. Opportunity for interaction is a factor of immense importance for social animals such as elephants, especially since the elephant with this circus is female. Rating was 0.0 for occurrence of interaction among conspecifics. The value for group size of the elephants was also 0.0.

Chaining

- The animal was chained for 22 hours through the day by its leg.
- It was not allowed to free range

The elephant was chained for most part of the day, hence, rating of 0.0 was given. There was no opportunity to free range, even at night, when it was not used for work. This feature was also given a rating of 0.0.

Behaviour

- The elephant was said to be calm with no reported incidents of aggression.
- It was said to exhibit stereotypy of medium intensity

Observed behaviour of the animals was rated based on the ease with which the elephant interacted with people and other animals. Rating was 10.0 with the elephant being described as calm. The expression of stereotypic behaviour by the animals was also rated. The animal was given a rating of 0.0 for this parameter as it was exhibiting stereotypy. A rating of 2.5 was assigned for intensity of stereotypy.

Work

- Performing tricks in front of an audience, walking around the arena for 15 minutes per show.
- Also used for begging from public
- The animal was used to announce and give publicity for the circus

Work forms an indivisible part of a circus animal. The nature of work which the elephant performed was rated. Work type which was alien to their natural behaviour was given low rating. Mean rating was 0.0

Provision of food

- Provided only stall feed, near the circus tent
- Food items were cooked rice and only coconut palm leaves
- Ration chart was not used

Captive elephants usually do not have the opportunity to free range to browse / graze for food, which forms an important part of their natural life in the wild. Kane, et.,al. (2002) mention a number of studies which maintain that wild elephants spend a large portion of their time foraging. Low ratings show lack of the above mentioned activity. Rating was 0.0 for this elephant as it was given only stall feed (Figure 2).

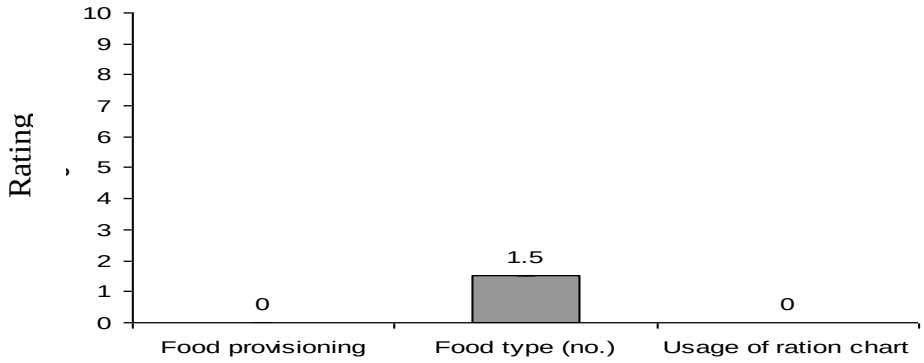


Figure 2: Rating for food

Reproductive status

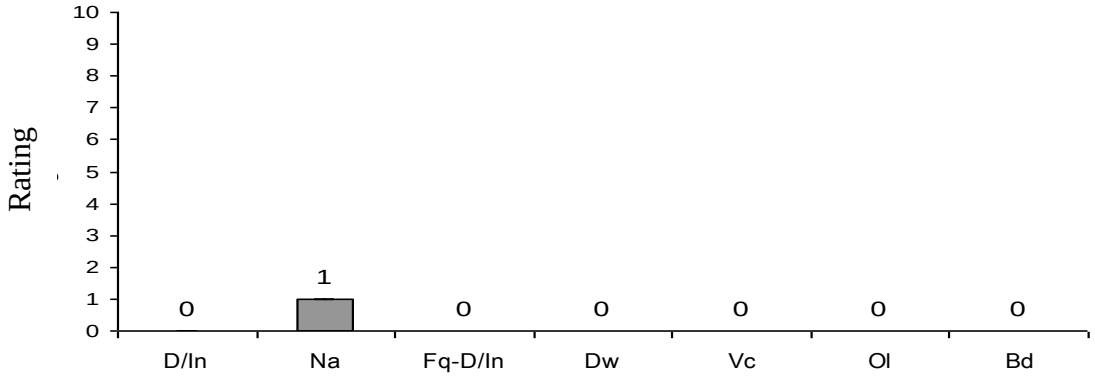
- The elephant was apparently not experiencing oestrous cycle.
- It was not exposed to males or allowed to breed

The elephant was not apparently experiencing oestrous cycles; hence a rating of 0.0 was given. It was not exposed to males or allowed to breed. Both parameters were given a rating of 0.0.

Health status

- Misshapen foot, nail cracks, fresh wounds between nails, chronic wounds on forelegs and foot rot was observed in the animal.
- The animal was experiencing bowel instability in the form of constipation and diarrhea.
- The animal was anemic as observed from the pale nature of its oral cavity.
- White line was noticed around the cornea of the eye.
- No vaccination or deworming was done.
- Application of medicated oil was also not done

Improper living conditions can affect the health of the captive animal. Status of health was rated across seven sub-parameters (Figure 3) with low values designed to show poor status. Overall mean rating was 0.14 (SE =0.1, N = 7). The elephant was reported to have several instances of foot and gastro-intestinal diseases. Rating was 0.0. The animal had not been vaccinated for any disease. Rating was 0.0. The situation regarding deworming was the same, for which a rating of 0.0 was given. The application of oil on the animal was not done.



D/In: Occurrence of disease/ injury Na: Nature of disease/ injury
Fq-D/In: frequency of disease/ injury Dw: Deworming status
Vc: Vaccination status Ol: Oiling done
Bd: Body measurements taken

Figure 3: Rating for 'health' sub-parameters

Veterinary care

Rating was 0.0 as the circus did not have any permanent arrangement regarding consultation/ treatment by a veterinary doctor. There was also no provision of a veterinary assistant or veterinary care facility. Both the parameters were given a rating of 0.0. Record keeping and other related aspects and body measurements were also not taken

Overall rating pattern for the elephant

Overall mean rating was 1.34 (SE = 0.06, N** = 31), and about 70 % ratings fall under zero (Figure 4) implying occurrence of bad welfare conditions

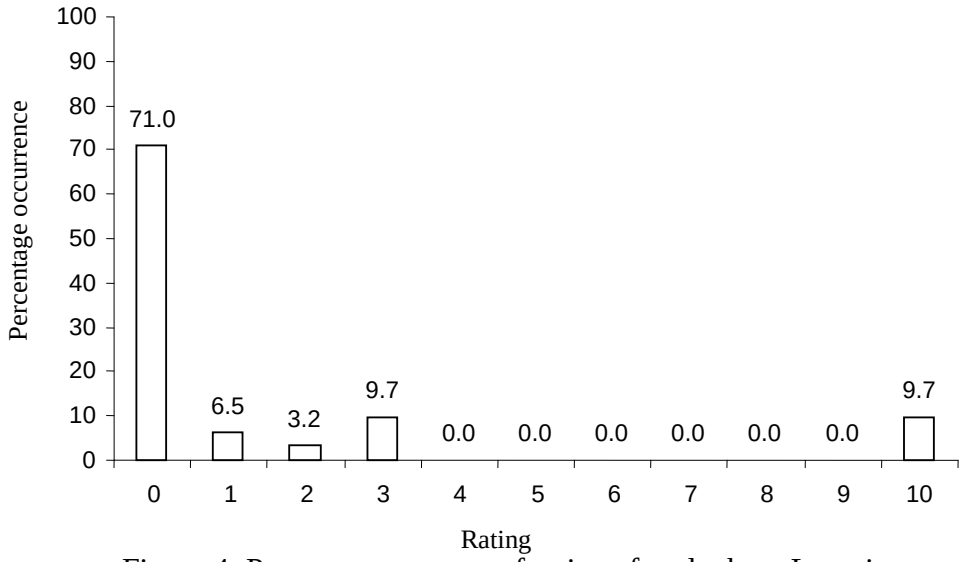


Figure 4: Percent occurrence of ratings for elephant Laxmi

Distribution of ratings

About 80 percentage of values (Figure 5) fall within bad category and 10 % were poor and only 10% values were satisfactory.

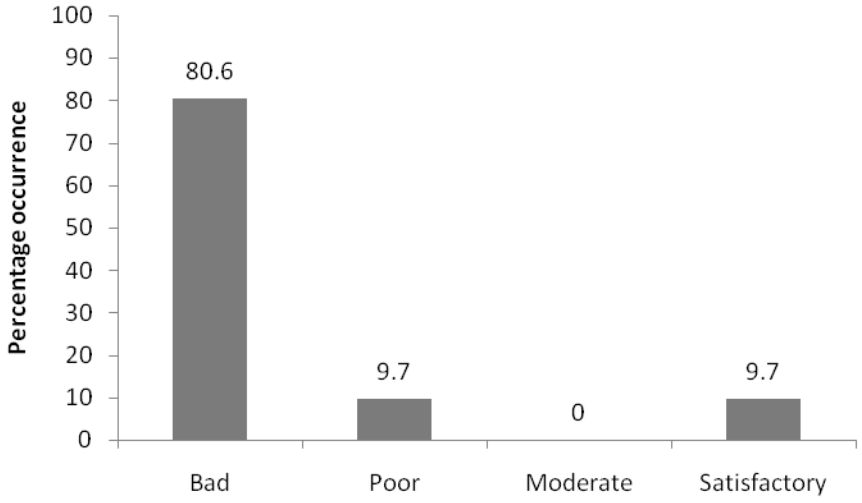


Figure 5: Distribution of ratings

Mahout
The appointed mahout for the elephant was not to be seen and a single boy, aged around 20 yrs. was said to be handling the animal. His attitude toward the animal was described as affectionate.

Discussion
Overall mean rating was 1.34 suggesting bad welfare conditions of the elephant kept in this circus. It is common knowledge that elephants in the wild especially females, live in groups of related individuals. The occurrence of "family groups" consisting of mothers and their offspring has been reported (Sukumar, 1994).

Despite this obvious feature of their lives, the maintenance of single, female elephants in un-natural physical conditions around human habitation with severe restriction on their ability to move freely even within a circumscribed surrounding is unwarranted. The physical and social environment experienced by elephants in the wild was conspicuous by its absence for this elephant.

Parameters in the "poor to bad" category:

- Shelter: there was no provision of a suitable shelter. The animal was exposed to sunlight as there was no shade available. Mean temperatures in both circus locations ranged from 25- 35°C (in the region of 40° C for Palaghat). Thermoregulation in large-sized mammals has been reported to be a function, among other variables, of the behaviour of the animal (Langman, 1996). Chaining of the elephant for more than 20 hours a day effectively reduced the animal's ability to choose a suitable place for itself.

- Water: use of buckets to provide water meant that the animal could not access it whenever it needed. It had to depend on its handler to provide the same.

- Social isolation: maintenance of a single animal ensured absence of conspecifics for interaction. Coupled with this fact was the expression of stereotypy by the elephant. Stereotypy was exhibited in greater frequency among socially isolated elephants (Kurt and Garai, 2007). The expression of stereotypy is considered to be an indicator of poor welfare conditions.

- The acyclic nature of an adult female represents an abnormal physiological condition of the animal. Bearden and Fuquay (2000)† report that non- social stress can also lead to absence of normal oestrus cycles in females.

- Treatment of illnesses or injuries of the elephant depended on the availability of a veterinary doctor on site. This implies absence of basic veterinary care for the animal, especially in case of an emergency.

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†: Original not referred

Appendix 1: Details of elephants obtained through micro-chipping of them in Kerala

.no	Nameof the elephant	Sex	Age	Ownership	District
1	Mahadevan (Maheswaran)	Male	17	Ashram Art of Living	Thiruvananthapuram
2	Lekshmi	Female	16	Ashram Amrtha	Kollam
3	Raman	Male	8	Ashram Amrtha	Kollam
4	Anjana	Female	2.5	FC	Ernakulam
5	Asha	Female	4.5	FC	Ernakulam
6	Neelakandan	Male	12	FC	Ernakulam
7	Parvathy	Female	3	FC	Ernakulam
8	Sunitha	Female	38	FC	Ernakulam
9	Mony	Male	62	FC	Kollam
10	Eva	Female	7	FC	Pathanamthitta
11	Meena	Female	18	FC	Pathanamthitta
12	Priyadarshni	Female	25	FC	Pathanamthitta
13	Soman	Male	66	FC	Pathanamthitta
14	Surendran	Male	10	FC	Pathanamthitta
15	Dinesan	Male	55	FC	Wayanad
16	Kunju	Male	NA	FC	Wayanad
17	Surya	Male	NA	FC	Wayanad
18	Ammu	Female	7	FC	Thiruvananthapuram
19	Jayasree	Female	37	FC	Thiruvananthapuram
20	Minna	Female	6.5	FC	Thiruvananthapuram
21	Renji	Male	66	FC	Thiruvananthapuram
22	Kannan	Male	NA	Private	Idukki
23	Gopalan	Male	40	Private	Ernakulam
24	Unnikrishnan	Male	39	Private	Thrissur
25	Govindankutty	Male	46	Private	Kottayam
26	Mahesh	Male	36	Private	Ernakulam
27	Sundari	Female	52	Private	Kozhikode
28	Arjun	Male	43	Private	Kozhikode
29	Suseela	Female	35	Private	Kozhikode
30	Varun	Male	20	Private	Kannur
31	Sankarankutty	Male	27	Private	Kottayam
32	Gangadaran	Male	38	Private	Kottayam
33	Meera	Female	35	Private	Kottayam
34	Sreeraman	Male	36	Private	Kottayam
35	Vijayan	Male	34	Private	Kottayam
36	Ganesan	Male	39	Private	Kottayam
37	Sheela	Female	35	Private	Kottayam
38	Sundari	Female	16	Private	Kottayam
39	Balagopalan	Male	42	Private	Pathanamthitta
40	Appu	Male	41	Private	Ernakulam

41	Ramu (Elias) Ganapathy	Male	16	Private	Ernakulam
42	Saraswathy	Male	60	Private	Kannur
43	Manikandan	Male	39	Private	Kannur
44	Arjunan	Male	45	Private	Ernakulam
45	Saaj Prasad	Male	NA	Private	Thrissur
46	Karuvattoor Vignesh	Male	39	Private	Palakkad
47	Poothrukovil Ganapathy	Male	47	Private	Thrissur
48	Unnikrishnan	Male	12	Private	Alappuzha
49	Ganeshan Alias Kuttikrishnan	Male	57	Private	Alappuzha
50	Mohanan	Male	38	Private	Idukki
51	Harikuttan	Male	31	Private	Kottayam
52	Vijayan	Male	49	Private	Kollam
53	Bastin Vinayachandran	Male	38	Private	Thrissur
54	Bastin Vinayasankar	Male	32	Private	Thrissur
55	Mohanan	Male	52	Private	Ernakulam
56	Kannan	Male	39	Private	Idukki
57	Uttoly Ayyappan	Male	23	Private	Thrissur
58	Madhavan	Male	43	Private	Thiruvananthapuram
59	Arun Ayyappan	Male	32	Private	Ernakulam
60	Pattathu Sreekrishnan	Male	41	Private	Thrissur
61	Lekshmi	Female	43	Private	Idukki
62	Ambady Kannan Kalarikavu	Male	6.5	Private	Thrissur
63	Usha	Female	48	Private	Kottayam
64	Lekshmikkutty	Female	45	Private	Kottayam
65	Sreekuttan	Male	25	Private	Alappuzha
66	Ganapathy	Male	32	Private	Kottayam
67	Sivan Thottakkad	Male	35	Private	Kottayam
68	Keerthi	Female	52	Private	Kottayam
69	Ramachandran	Male	41	Private	Kottayam
70	Sankarankutty	Male	38	Private	Kottayam
71	Sreenivasan	Male	50	Private	Kottayam
72	Lekshmi (Roopa)	Female	30	Private	Kottayam
73	Sekharan	Male	42	Private	Kottayam
74	Santhakumari	Female	44	Private	Kottayam
75	Vijaya Lakshmi	Female	31	Private	Kottayam
76	Krishna Das	Male	50	Private	Ernakulam
77	Krishna Prasad	Male	38	Private	Ernakulam
78	Kuttikrishnan (Alias Sreeparameswaran)	Male	44	Private	Ernakulam
79	Lohi Prasad	Male	31	Private	Kollam
80	Vasanthi	Female	44	Private	Pathanamthitta
81	Shenoy Chandrasekharan	Male	56	Private	Ernakulam
82	Sreenivasan	Male	42	Private	Ernakulam

83	Hamsa Raj	Male	58	Private	Wayanad
84	Sonu Unnikrishnan	Male	7	Private	Kollam
85	Baladevan	Male	32	Private	Kollam
86	Rajagopal	Male	36	Private	Kollam
87	Sree Vinayakan	Male	48	Private	Kollam
88	Parameswaran	Male	28	Private	Kottayam
89	Anandapadmanabhan	Male	42	Private	Kottayam
90	Kangazha Narayanankutty	Male	42	Private	Kottayam
91	Anupama	Female	33.5	Private	Alappuzha
92	Kumar	Male	18	Private	Kottayam
93	Mullath Vijayakrishnan	Male	13	Private	Thrissur
94	Ganapathy	Male	33	Private	Thrissur
95	Konark Ganapathy	Male	29	Private	Thrissur
96	Arjun	Male	31	Private	Kottayam
97	Mangal	Male	24	Private	Kottayam
98	Arjun (Babumon)	Male	38	Private	Kottayam
99	Sankarankutty	Male	42	Private	Kottayam
100	Balakrishnan	Male	50	Private	Ernakulam
101	Chandu Nandileth	Male	7.5	Private	Thrissur
102	Lekshmi	Female	36	Private	Kannur
103	Kannan	Male	28	Private	Kollam
104	Mahavishnu	Male	18	Private	Kollam
105	Kochuganeshan	Male	11	Private	Kollam
106	Kutty Sankaran	Male	46	Private	Thrissur
107	Chembukavu Vijay Kannan	Male	25	Private	Thrissur
108	Bolonath	Male	35	Private	Kottayam
109	Raja	Male	26	Private	Kollam
110	Lekshmi Bai	Female	14	Private	Kottayam
111	Sreekandan	Male	27	Private	Kollam
112	Mohandas	Male	40	Private	Kollam
113	Mangalath Edamana Ganesan	Male	32	Private	Thrissur
114	Viswanathan	Male	19	Private	Kollam
115	Devadathan	Male	50	Private	Palakkad
116	Devanarayanan	Male	45	Private	Thrissur
117	Kiran Ganapathy	Male	41	Private	Kottayam
118	Kiran Narayanankutty	Male	38	Private	Kottayam
119	Mangalamkunnu Kannan	Male	46	Private	Palakkad
120	Mangalamkunnu Appu	Male	16	Private	Palakkad
121	Mangalamkunnu Ayyappan	Male	36	Private	Palakkad
122	Lakshmi	Female	34	Private	Ernakulam
123	Indira (Maria)	Female	40	Private	Kottayam
124	Kannan	Male	0.5	Private	Kottayam
125	Malathy	Female	27	Private	Kottayam

126	Beena	Female	30	Private	Kottayam
127	Kannan	Male	29	Private	Kottayam
128	Sivankutty	Male	36	Private	Kottayam
129	Edakkulathur Devanarayanan	Male	12	Private	Thrissur
130	Murukan	Male	41	Private	Kollam
131	Vinayakan	Male	19	Private	Kollam
132	Sunder Singh	Male	15	Private	Kollam
133	Arjun	Male	48	Private	Thrissur
134	Mohanan	Male	43	Private	Kottayam
135	Rambha	Female	28	Private	Kottayam
136	Neelakandan	Male	32	Private	Pathanamthitta
137	Saraswathy	Female	46	Private	Kozhikode
138	Leela	Female	38	Private	Kottayam
139	Ayyappankutty (Raja)	Male	8	Private	Palakkad
140	Manjeri Arjunan	Male	46	Private	Thrissur
141	Ganapathy (Devanarayan)	Male	43	Private	Kottayam
142	Vijay	Male	49	Private	Thiruvananthapuram
143	Karnan Kadayinikkad	Male	33	Private	Kottayam
144	Bola	Male	32	Private	Kollam
145	Dhananjayan	Male	32	Private	Kozhikode
146	Parukkutty	Female	55	Private	Alappuzha
147	Lekshmi	Female	42	Private	Idukki
148	Aneesha	Female	36	Private	Ernakulam
149	Elavumthadathil Unnikrishnan	Male	52	Private	Ernakulam
150	Puthussery Prabhu	Male	28	Private	Thrissur
151	Rajendran	Male	NA	Private	Palakkad
152	Reghuram Manisseri	Male	39	Private	Palakkad
153	Mukundan - Mangalamkunnu	Male	34	Private	Palakkad
154	Bhagavathy	Female	52	Private	Kozhikode
155	Ganeshan	Male	13	Private	Kottayam
156	Kesavan	Male	42	Private	Kottayam
157	Pala Kannan	Male	36	Private	Kottayam
158	Ganeshan	Male	31	Private	Kottayam
159	Sai Krishnan	Male	11	Private	Kollam
160	Nakulan	Male	36	Private	Pathanamthitta
161	Manmohan	Male	9	Private	Kannur
162	Vijayan	Male	36	Private	Kozhikode
163	Savithri	Female	43	Private	Malappuram
164	Sundari	Female	58	Private	Malappuram
165	Laila	Female	45	Private	Kozhikode
166	Manikantan	Male	40	Private	Ernakulam
167	Rajalekshmi	Female	46	Private	Kottayam
168		Male	NA	Private	Thrissur

169	Ganesh	Male	46	Private	Kollam
170	Rajasekharan	Male	31	Private	Kottayam
171	Madavan (Samsher Singh)	Male	33	Private	Kottayam
172	Unnikrishnan	Male	40	Private	Pathanamthitta
173	Mohanan	Male	48	Private	Kottayam
174	Ayyappankutty	Male	43	Private	Kottayam
175	Gowri Nandanan	Male	5	Private	Thiruvananthapuram
176	Jayaram Kannan	Male	47	Private	Ernakulam
177	Ambika	Female	50	Private	Kollam
178	Chathapuram Baby	Male	30	Private	Palakkad
179	Mavelikkara Krishnankutty	Male	17	Private	Alappuzha
180	Hiran	Male	52	Private	Wayanad
181	Rajeevan	Male	42	Private	Kottayam
182	Rani	Female	47	Private	Wayanad
183	Ayyappan	Male	14	Private	Idukki
184	Unnikuttan	Male	20	Private	Kottayam
185	Saseendran	Male	56	Private	Ernakulam
186	Sethu lekshmi	Female	55	Private	Kottayam
187	Ganeshan	Male	14	Private	Kannur
188	Akbar	Male	55	Private	Kottayam
189	Lekshmi	Female	47	Private	Kottayam
190	Ayyappan Kutty	Male	37	Private	Idukki
191	Unni	Male	32	Private	Idukki
192	Ayyappan	Male	40	Private	Palakkad
193	Jayadevan	Male	36	Private	Ernakulam
194	Suma	Female	39	Private	Thiruvananthapuram
195	Ollukkara Jayaram	Male	21	Private	Thrissur
196	Puthuppally Kesavan	Male	35	Private	Kottayam
197	Aromal	Male	7	Private	Alappuzha
198	Vasudevan	Male	50	Private	Kollam
199	Sekharan	Male	26	Private	Kottayam
200	Vishnu	Male	35	Private	Ernakulam
201	Balan	Male	10	Private	Kollam
202	Vijayalekshmi	Female	49	Private	Alappuzha
203	Mini	Female	34	Private	Malappuram
204	Gangadharan	Male	42	Private	Malappuram
205	Appu	Male	19	Private	Malappuram
206	Ramachandran	Male	42	Private	Malappuram
207	Manikantan	Male	41	Private	Alappuzha
208	Ganapathy	Male	38	Private	Palakkad
209	Mohanakrishnan	Male	39	Private	Palakkad
210	Vijayan	Male	46	Private	Palakkad
211	Kesavan	Male	50	Private	Palakkad

212	Mini	Female	22	Private	Kottayam
213	Parameswaran	Male	NA	Private	Thrissur
214	Uttoly Mahadevan	Male	8	Private	Thrissur
215	Adisankaran	Male	32	Private	Palakkad
216	Rajasekharan	Male	40	Private	Thiruvananthapuram
217	Ganesan	Male	10	Private	Thiruvananthapuram
218	Oottoly Ganapathy	Male	37	Private	Thrissur
219	Oottoly Padmanabhan	Male	37	Private	Thrissur
220	Ashokan	Male	41	Private	Kottayam
221	Ganapathy	Male	35	Private	Alappuzha
222	Vasudevan	Male	44	Private	Kozhikode
223	Kaveri	Female	43	Private	Kozhikode
224	Devidasan	Male	22	Private	Palakkad
225	Ayyappankutty	Male	NA	Private	Kottayam
226	Mahadevan	Male	42	Private	Palakkad
227	Cheeroth Cheriya Rajeev	Male	34	Private	Thrissur
228	Sree Padmanabhan	Male	22	Private	Kollam
229	Sreeraman	Male	18	Private	Kottayam
230	Kallumpuram Kannan	Male	32	Private	Palakkad
231	Kesavan	Male	35	Private	Palakkad
232	Kasthuri Bai	Female	54	Private	Kollam
233	Parukkutty	Female	55	Private	Kasaragod
234	Vanaja	Female	45	Private	Kottayam
235	Kiran Kannan	Male	39	Private	Kottayam
236	Sivankutty	Male	35	Private	Alappuzha
237	Prasad	Male	22	Private	Ernakulam
238	Unnikrishnan	Male	38	Private	Ernakulam
239	Lekshmi	Female	44	Private	Kozhikode
240	Uma	Female	36	Private	Alappuzha
241	Bahadur Alia	Male	30	Private	Kollam
242	Paramekkavu Narayanan	Male	60	Private	Thrissur
243	Ayyappan (Swaminadhan Ganesan)	Male	50	Private	Thrissur
244	Arunkumar	Male	35	Private	Ernakulam
245	Unnikrishnan	Male	32	Private	Kottayam
246	Ramachandran	Male	36	Private	Kottayam
247	Sulthan	Male	55	Private	Kottayam
248	Ganapathy	Male	35	Private	Pathanamthitta
249	Gajendran	Male	31	Private	Pathanamthitta
250	Karnan	Male	20	Private	Pathanamthitta
251	Deepu	Male	37	Private	Pathanamthitta
252	Krishnankutty	Male	51	Private	Kottayam
253	Unnikkuttan	Male	13	Private	Kottayam
254	Indira	Female	58	Private	Malappuram

255	Padmini	Female	57	Private	Malappuram
256	Ganagalakshmi	Female	38	Private	Kannur
257	Rajagopalan	Male	39	Private	Ernakulam
258	Rembha	Female	39	Private	Palakkad
259	Ramachandran	Male	39	Private	Kottayam
260	Kannan	Male	12	Private	Kollam
261	Sunder Singh	Male	28	Private	Kollam
262	Ayyappan	Male	38	Private	Kollam
263	Ganga Prasad	Male	43	Private	Kollam
264	Indira	Female	38	Private	Thiruvananthapuram
265	Sree Raman	Male	37	Private	Kottayam
266	Venugopal	Male	35	Private	Kottayam
267	Ayyappan	Male	9	Private	Ernakulam
268	Gopalankutty	Male	57	Private	Malappuram
269	Sathi (Sarala)	Female	48	Private	Kozhikode
270	Rajeevan	Male	34	Private	Kottayam
271	Meenakshi	Female	40	Private	Kottayam
272	Kuttysankaran	Male	42	Private	Ernakulam
273	Jimmy	Female	39	Private	Malappuram
274	Vishnu	Male	39	Private	Ernakulam
275	Krishnan	Male	36	Private	Thrissur
276	Ravisankar	Male	32	Private	Thrissur
277	Muralikrishnan	Male	32	Private	Palakkad
278	Kunju	Male	36	Private	Ernakulam
279	Kannan (Alias Govindan)	Male	39	Private	Ernakulam
280	Velayudhan	Male	42	Private	Kozhikode
281	Sree Lakshmi	Female	9	Private	Kozhikode
282	Nanu Ezhuthachan Sreenivasan	Male	52	Private	Thrissur
283	Devikrishnan	Male	38	Private	Thrissur
284	Vishnu Narayanan	Male	19	Private	Ernakulam
285	Poomully Arjunan	Male	38	Private	Palakkad
286	Soman	Male	45	Private	Alappuzha
287	Aswin (Achu)	Male	19	Private	Pathanamthitta
288	Rajagopalan	Male	38	Private	Kottayam
289	Sekharan	Male	45	Private	Kottayam
290	Mahadevan	Male	44	Private	Kottayam
291	Prakash Sankar	Male	36	Private	Thrissur
292	Mony alias Sankaran	Male	42	Private	Kollam
293	Gopalakrishnan Alias Manikantan	Male	31	Private	Palakkad
294	Abhimanyu	Male	16	Private	Kollam
295	Kalidasan	Male	24	Private	Thrissur
296	Guruvayoorappan - Mangalamkunnu	Male	44	Private	Palakkad
297	Mangalamkunnu Ganapathy	Male	62	Private	Palakkad

298	Mangalamkunnu Karthikeyan	Male	29	Private	Palakkad
299	Mangalamkunnu Kesavan	Male	38	Private	Palakkad
300	Ramachandran Mangalamkunnu	Male	38	Private	Palakkad
301	Vijayan - Mangalamkunnu	Male	49	Private	Palakkad
302	Pushpa	Female	NA	Private	Kottayam
303	Sreekrishnapuram Vijay	Male	11	Private	Palakkad
304	Manikantan	Male	17	Private	Ernakulam
305	Madhusankar	Male	42	Private	Palakkad
306	Bramadatta	Male	43	Private	Kottayam
307	Ganeshan	Male	39	Private	Kottayam
308	Lucky Prasad	Male	34	Private	Kottayam
309	Lucki	Female	51	Private	Kottayam
310	Bhadra	Female	22	Private	Kottayam
311	Puthuppally Sadhu	Male	42	Private	Kottayam
312	Mothy	Male	32	Private	Ernakulam
313	Lekshmanan	Male	37	Private	Kollam
314	Kalidasan - Palode	Male	45	Private	Palakkad
315	Kuttikrishnan	Male	36	Private	Kozhikode
316	Gajendran (Prithwiraj)	Male	40	Private	Kozhikode
317	Ramankutty	Male	43	Private	Alappuzha
318	Rajasekharan	Male	49	Private	Kottayam
319	Sankarankutty (Kannan)	Male	23	Private	Alappuzha
320	Ammu Alias Vally	Female	20	Private	Thiruvananthapuram
321	Ayyappan	Male	32	Private	Kollam
322	Vijayalakshmi	Female	45	Private	Kozhikode
323	Kannan	Male	10	Private	Thiruvananthapuram
324	Ganesan	Male	37	Private	Thiruvananthapuram
325	Pattathanam Kesavan	Male	27	Private	Kollam
326	Mahadevan	Male	35	Private	Kollam
327	Arjunan	Male	30	Private	Kollam
328	Ochira Mohan	Male	36	Private	Alappuzha
329	Karnan	Male	45	Private	Thiruvananthapuram
330	Anantha Padmanabhan	Male	35	Private	Thiruvananthapuram
331	Ayyappan	Male	33	Private	Thiruvananthapuram
332	Karnan	Male	34	Private	Thiruvananthapuram
333	Parthan	Male	31	Private	Thiruvananthapuram
334	Unnikkuttan	Male	8	Private	Thiruvananthapuram
335	Kavitha	Female	20	Private	Kollam
336	Indira	Female	34	Private	Thiruvananthapuram
337	Rajasekharan	Male	29	Private	Ernakulam
338	Vijayan	Male	46	Private	Kollam
339	Rajiswaran	Male	29	Private	Kollam
340	Parannur Gopan	Male	39	Private	Thrissur

341	Ganeshan	Male	16	Private	Pathanamthitta
342	Kannan	Male	38	Private	Pathanamthitta
343	Murukan	Male	34	Private	Pathanamthitta
344	Vinayakan	Male	34	Private	Pathanamthitta
345	Vishnu	Male	14	Private	Pathanamthitta
346	Vaijayanthi	Female	50	Private	Thiruvananthapuram
347	Rajan	Male	42	Private	Kottayam
348	Mohan	Male	42	Private	Thiruvananthapuram
349	Vettathu Govindankutty	Male	21	Private	Thrissur
350	Manik	Male	27	Private	Kollam
351	Sivasankar	Male	51	Private	Thrissur
352	Sudheer Alias Sreekrishnan	Male	34	Private	Thrissur
353	Mahadevan	Male	34	Private	Pathanamthitta
354	Deepak	Male	31	Private	Alappuzha
355	Reena	Female	38	Private	Wayanad
356	Rani	Female	39	Private	Wayanad
357	Mahadevan Alias Manik	Male	45	Private	Thiruvananthapuram
358	Gopalan alias Ramu	Male	46	Private	Thiruvananthapuram
359	Cherpalassery Manikantan	Male	12	Private	Palakkad
360	Cherpalassery Vishnu	Male	43	Private	Palakkad
361	Mangalamkunnu Krishnankutty	Male	45	Private	Palakkad
362	Ayyappadas	Male	33	Private	Thrissur
363	Vishnu	Male	39	Private	Kottayam
364	Mahadevan Palode	Male	30	Private	Palakkad
365	Achuthankutty	Male	13	Private	Pathanamthitta
366	Raveendran	Male	39	Private	Kollam
367	Vishnunarayanan (Doram Singh)	Male	16	Private	Kottayam
368	Kannan	Male	3.5	Private	Thrissur
369	Bijat Prasad (Rajasekharan)	Male	27	Private	Kollam
370	Bhadra	Female	33	Private	Malappuram
371	Thanka (Monisha)	Female	43	Private	Kottayam
372	Sivaprasad	Male	47	Private	Idukki
373	Jayasree	Female	40	Private	Alappuzha
374	Suresh	Male	42	Private	Kollam
375	Sankaran Kutty	Male	28	Private	Kottayam
376	Sreedevi	Female	39	Private	Kozhikode
377	Babu	Male	50	Private	Kozhikode
378	Guruvayoorappan	Male	28	Private	Kottayam
379	Ganasan	Male	NA	Private	Ernakulam
380	Vinayakan	Male	10	Private	Kollam
381	Vinod	Male	33	Private	Kollam
382	Rajasekharan	Male	48	Private	Kollam
383	Amakavu Vishnu (Motti Prasad)	Male	37	Private	Palakkad

384	Indrajith	Male	9	Private	Thrissur
385	Gangadharan	Male	34	Private	Pathanamthitta
386	Unnikrishnan	Male	40	Private	Pathanamthitta
387	Prasad	Male	38	Private	Kottayam
388	Manik	Male	25	Private	Kottayam
389	Anil Babu	Male	35	Private	Kottayam
390	Indira	Female	46	Private	Wayanad
391	Manikkam - Achu	Male	21	Private	Kollam
392	Rajasekharan	Male	14	Private	Alappuzha
393	Meera	Female	36	Private	Kottayam
394	Kunju	Male	19	Private	Thrissur
395	Karthikeyan	Male	45	Private	Palakkad
396	Sreekuttan	Male	28	Private	Malappuram
397	Bushra	Female	40	Private	Malappuram
398	Muthu	Male	28	Private	Kozhikode
399	Devanarayanan	Male	45	Private	Kollam
400	Gopalankutty	Male	38	Private	Kottayam
401	Pallimattam Ramankutty	Male	32	Private	Ernakulam
402	Sivankutty	Male	33	Private	Kottayam
403	Ganapathy	Male	30	Private	Alappuzha
404	Meena	Female	30	Private	Kottayam
405	Panackal Padmanabhan	Male	26	Private	Kollam
406	Keru	Male	8	Private	Kollam
407	Koyiparambil Ayyappan	Male	50	Private	Thrissur
408	Lekshmi	Female	33	Private	Idukki
409	Ramachandran	Male	35	Private	Pathanamthitta
410	Arjun	Male	35	Private	Kottayam
411	Arjun	Male	40	Private	Kottayam
412	Mahadevan	Male	15	Private	Kollam
413	Anil	Male	42	Private	Thiruvananthapuram
414	Umamaheswaran	Male	39	Private	Thrissur
415	Vishnu Sankar	Male		Private	Thrissur
416	Ganeshan S N	Male	27	Private	Kottayam
417	Unnikrishnan	Male	48	Private	Kottayam
418	Sivaprasad	Male	27	Private	Kottayam
419	Mahesh - Manikantan	Male	39	Private	Kollam
420	Kuttikrishnan	Male	26	Private	Alappuzha
421	Sankarankutty	Male	48	Private	Idukki
422	Ganapathy Kaveri	Male	38	Private	Kollam
423	Neelakantan	Male	49	Private	Kottayam
424	Sankarankutty	Male	40	Private	Kottayam
425	Kesavan	Male	32	Private	Kottayam
426	Sooryan	Male	37	Private	Thrissur

427	Sri Ram	Male	NA	Private	Thrissur
428	Yadhukrishnan	Male	20	Private	Ernakulam
429	Vinod	Male	37	Private	Kottayam
430	Sivan	Male	1	Private	Kollam
431	Karnan	Male	33	Private	Kollam
432	Anandapadmanabha	Male	34	Private	Kollam
433	Shyam	Male	9	Private	Kottayam
434	Kochayyappan	Male	35	Private	Kottayam
435	Gopalakrishnan	Male	NA	Private	Thrissur
436	Gangadharan	Male	32	Private	Kottayam
437	Siva	Male	20	Private	Kollam
438	Santha	Female	53	Private	Wayanad
439	Gopalan	Male	NA	Private	Ernakulam
440	Ayyappan	Male	34	Private	Kottayam
441	Vinayan	Male	35	Private	Thrissur
442	Abhimanew	Male	34	Private	Kottayam
443	Devadathan	Male	23	Private	Kollam
444	Unnikrishnan	Male	22	Private	Kollam
445	Ayyappan - Lava	Male	21	Private	Thiruvananthapuram
446	Chandru	Male	34	Private	Ernakulam
447	Rajeswari	Female	30	Private	Kottayam
448	Sivasankaran	Male	30	Private	Kollam
449	Chembakam	Female	30	Private	Kottayam
450	Rajan	Male	39	Private	Kottayam
451	Ganapathy	Male	37	Private	Kottayam
452	Gangadharan	Male	51	Private	Kottayam
453	Mahadevan	Male	34	Private	Thrissur
454	Balakrishnan	Male	42	Private	Ernakulam
455	Rajasekharan	Male	46	Private	Palakkad
456	Aswathy	Female	53	Private	Pathanamthitta
457	Gireesan	Male	44	Private	Ernakulam
458	Cherplassery Sekharan	Male	42	Private	Palakkad
459	Vallabha Das	Male	35	Private	Kottayam
460	Krishnankutty	Male	40	Private	Kottayam
461	Ganeshan	Male	34	Private	Thiruvananthapuram
462	Govindankutty - Palode	Male	36	Private	Palakkad
463	Kamala	Female	40	Private	Kottayam
464	Ganapathy Valiyaveettil	Male	33	Private	Kottayam
465	Indira	Female	40	Private	Kozhikode
466	Raju	Male	22	Private	Kollam
467	Sekharan	Male	28	Private	Kollam
468	Adiyatt Ayyappan	Male	17	Private	Thrissur
469	Vishnu	Male	22	Private	Kozhikode

470	Cherpulassery Parthan	Male	31	Private	Kollam
471	Neelakantan	Male	26	Private	Kollam
472		Female	39	Private	Ernakulam
473	Mekhanath	Male	16	Private	Thrissur
474	Kuttysankaran	Male	41	Private	Alappuzha
475	Edakunni Arjunan	Male	40	Private	Thrissur
476	Mangalamkunnu Aravindan	Male	36	Private	Palakkad
477	Ganapathy	Male	6	Private	Kollam
478	Parasuraman	Male	38	Private	Kollam
479	Rao	Male	42	Private	Kollam
480	Padmanabhan	Male	28	Private	Ernakulam
481	Koottanal Devadathan	Male	45	Private	Thrissur
482	Ramachandran (Thampi)	Male	55	Private	Kottayam
483	Ganeshan (Uzhavoor)	Male	44	Private	Kottayam
484	Pampady Rajan	Male	32	Private	Kottayam
485	Sundaran	Male	37	Private	Kottayam
486	Beegam	Female	36	Private	Kottayam
487	Beegam	Female	55	Private	Kottayam
488	Vinayakan	Male	33	Private	Kottayam
489	Kesavan	Male	37	Private	Kottayam
490	Erattupetta Ayyappan	Male	37	Private	Kottayam
491	Roopa	Female	38	Private	Pathanamthitta
492	Rosely	Female	39	Private	Idukki
493	Babu	Male	36	Private	Kottayam
494	Letha	Female	39	Private	Kottayam
495	Ganashan Vazhayil	Male	40	Private	Kottayam
496	Sankarankutty	Male	53	Private	Wayanad
497	Ayyappan	Male	46	Private	Kozhikode
498	Durgaprasad	Male	40	Private	Kottayam
499	Ganeshan	Male	47	Private	Kottayam
500	Ayyappankutty	Male	38	Private	Kottayam
501	Rajan	Male		Private	Palakkad
502	Unnikkuttan	Male	40	Private	Kottayam
503	Pampampottu Sivan	Male	39	Private	Thrissur
504	Gopalan Kutty	Male	43	Private	Kollam
505	Rajendran	Male	28	Private	Pathanamthitta
506	Lekshmi	Female	40	Private	Kottayam
507	Seemavathy	Female	35	Private	Kottayam
508	Kama Krishnan	Male	41	Private	Kottayam
509	Dulari	Female	41	Private	Kottayam
510	Chandran	Male		Private	Alappuzha
511	Raju	Male	37	Private	Alappuzha
512	Mohan Singh	Male	42	Private	Kottayam

513	Chundampatta Krishnankutty	Male	35	Private	Palakkad
514	Nagerimana Ayyappan	Male	NA	Private	Thrissur
515	Nagerimana Vasudevan	Male	38	Private	Thrissur
516	Kannan Thamarayoor	Male	23	Private	Thrissur
517	Govindan Kutty	Male	41	Private	Kottayam
518	Ramankutty	Male	34	Private	Ernakulam
519	Kariyath Mahadevan	Male	36	Private	Ernakulam
520	Gopal	Male	38	Private	Kozhikode
521	Parannur Nandan	Male	37	Private	Thrissur
522	Santha	Female	46	Private	Ernakulam
523	Kesavan	Male	29	Private	Kottayam
524	Reghuram (Ramachandran)	Male	61	Private	Thrissur
525	Lekshmikutty	Female	39	Private	Kottayam
526	Mohanan	Male	33	Private	Kottayam
527	Indira	Female	47	Private	Palakkad
528	Vallapuzha Gajendran	Male	53	Private	Palakkad
529	Ayyappan	Male	52	Private	Ernakulam
530	Megharjunan	Male	13	Temple KMD	Thrissur
531	Rajashekharan	Male	41	Temple Pvt	Palakkad
532	Sivasundaran	Male	22	Temple Pvt	Kannur
533	Padmanabhan	Male	44	Temple Pvt	Palakkad
534	Achuthan	Male	34	Temple Pvt	Kannur
535	Thirumala Gajendran	Male	19	Temple Pvt	Ernakulam
536	Sivan	Male	13	Temple Pvt	Kollam
537	Nandakumar	Male	50	Temple Pvt	Kollam
538	Manikantan	Male	11	Temple Pvt	Kollam
539	Ayyappan	Male	31	Temple Pvt	Thrissur
540	Sankarankulangara Udayan	Male	45	Temple Pvt	Thrissur
541	Kallankulangara Rajagopal	Male	43	Temple Pvt	Palakkad
542	Sreevally	Female	36	Temple Pvt	Kottayam
543	Prasad	Male	21	Temple Pvt	Kannur
544	Thayankavu Manikantan	Male	29	Temple Pvt	Thrissur
545	Darsini	Female	45	Temple Pvt	Thiruvananthapuram
546	Sree Parameswaran	Male	37	Temple Pvt	Palakkad
547	Pullukulangara Ganesan	Male	46	Temple Pvt	Alappuzha
548	Manikantan	Male	40	Temple Pvt	Kollam
549	Kuttisankaran (Gajarajan)	Male	31	Temple Pvt	Alappuzha
550	Sreehari	Male	33	Temple Pvt	Ernakulam
551	Thechikkottu Kavu Devidasan	Male	18	Temple Pvt	Thrissur
552	Thechikkottu Kavu Ramachandran	Male	42	Temple Pvt	Thrissur
553	Ramachandran	Male	41	Temple Pvt	Kollam
554	Parameswaran	Male	15.5	Temple Pvt	Thrissur
555	Manikandan	Male	44	Temple Pvt	Thrissur

556	Thirumullakkavu Manikantan	Male	33	Temple Pvt	Thrissur
557	Thiruvanikavu Rajagopal	Male	39	Temple Pvt	Thrissur
558	Kongadu Kuttisankaran	Male	44	Temple Pvt	Palakkad
559	Poothrukovil Sringarikarnan	Male	25	Temple Pvt	Thrissur
560	Chathapuram Vizhnu (Ganapathy)	Male	33	Temple Pvt BMKD	Palakkad
561	Viswanathan	Male	15	Temple Pvt BMKD	Kottayam
562	Chemboothra Devidasan	Male	35	Temple Pvt CKK	Thrissur
563	Thirumala Gajendran	Male	33	Temple Pvt CTDC	Ernakulam
564	Kalidasan	Male	46	Temple Pvt KBKC	Thrissur
565	Sreenivasan	Male	23	Temple Pvt KD	Thrissur
566	Ramu	Male	19	Temple Pvt KNDK	Alappuzha
567	Arjunan	Male	39	Temple Pvt KUKGD	Thrissur
568	Kuttankulangara Ramdas	Male	45	Temple Pvt KUKGD	Thrissur
569	Vijayan	Male	42	Temple Pvt MKP	Alappuzha
570	Mahadevan	Male	32	Temple Pvt MRKLGRAD	Kollam
571	Manikantan	Male	NA	Temple Pvt NSDKSSD	Kollam
572	Kaleedasan	Male	19	Temple Pvt OLDO	Thrissur
573	Narayanankutty	Male	39	Temple Pvt PMTT	Pathanamthitta
574	Paramekkavu Rajendran	Male	55	Temple Pvt PRKD	Thrissur
575	Parappukavu Kalidasan	Male	41	Temple Pvt PRKD	Thrissur
576	Paramekkavu Devidasan	Male	40	Temple Pvt PRKD	Thrissur
577	Paramekkavu Sree Padmanabhan	Male	33	Temple Pvt PRKD	Thrissur
578	Thiruvambady Ramabhadran	Male	47	Temple Pvt THBDYD	Thrissur
579	Thiruvambady Chandrasekharan	Male	32	Temple Pvt THBDYD	Thrissur
580	Thiruvambady Sivasundar	Male	37	Temple Pvt THBDYD	Thrissur
581	Thiruvambady Unnikrishnan	Male	36	Temple Pvt THBDYD	Thrissur
582	Chandra Sekharan	Male	45	Temple Pvt-SKD	Kannur
583	Ambalappuzha Vijayakrishnan	Male	38	Temple TD	Alappuzha
584	Avoor Kannan	Male	18	Temple TD	Alappuzha
585	Harippad Skandan	Male	18	Temple TD	Alappuzha
586	Kandiyoor Premsankar	Male	18	Temple TD	Alappuzha
587	Mavelikkara Unnikrishnan	Male	32	Temple TD	Alappuzha
588	Panmana Saravanan	Male	17	Temple TD	Alappuzha
589	Vettikkattu Chandrasekharan	Male	42	Temple TD	Alappuzha
590	Sasthamkotta Neelakantan	Male	15	Temple TD	Kollam
591	Cheryvally Kusumam	Female		Temple TD	Kottayam
592	Thiru Neelakantan	Male	36	Temple TD	Kottayam
593	Thirunnakkara Sivan	Male	38	Temple TD	Kottayam
594	Manikantan - Oomalloor	Male	36	Temple TD	Pathanamthitta
595	Mohanan - Aranmula	Male	46	Temple TD	Pathanamthitta
596	Parthasarathy - Aranmula	Male	45	Temple TD	Pathanamthitta
597	Rajan - Malayalappuzha	Male	48	Temple TD	Pathanamthitta

598	Kunnanthanam Sivasankaran	Male	23	Temple TD	Thiruvananthapuram
599	Lekshmi	Female	58	Temple TD	Thiruvananthapuram
600	Vadakkan Paravoor Sasi	Male	48	Temple TD	Ernakulam
601	Kodungoor Vaijayanthy	Female	42	Temple TD	Kottayam
602	Aadinad Sudeesh	Male	32	Temple TD	Thiruvananthapuram
603	Asramam Gopalakrishnan	Male	28	Temple TD	Thiruvananthapuram
604	Jayaraj	Male	13	Temple TD	Thiruvananthapuram
605	Mullakkal Balakrishnan	Male	38	Temple TD	Thiruvananthapuram
606	Prameela	Female	70	Temple TD	Thiruvananthapuram
607	Sanjayan	Male	31	Temple TD	Thiruvananthapuram
608	Thrikkadavoor Sivaraju	Male	36	Temple TD	Thiruvananthapuram
609	Uma	Female	NA	Temple TD	Thiruvananthapuram
610	Velinelloor Manikandan	Male	32	Temple TD	Thiruvananthapuram
611	Krishnankutty	Male	70	Temple TD	Kollam
612	Dakshayani	Female	76	Temple TD	Thiruvananthapuram
613	Karthikeyan	Male	35	Temple TD	Thiruvananthapuram
614	Sivakumar	Male	55	Temple TD	Thiruvananthapuram
615	Anjaneyan	Male	35	Temple TD	Thiruvananthapuram
616	Chandrasekharan	Male	45	Temple TD	Thiruvananthapuram
617	Devanarayanan	Male	18	Temple TD	Thiruvananthapuram
618	Kalidasan	Male	20	Temple TD	Thiruvananthapuram
619	Kannan	Male	13	Temple TD	Thiruvananthapuram
620	Saraswathy	Female	30	Temple TD	Thiruvananthapuram
621	Sivasankaran	Male	10	Temple TD	Thiruvananthapuram
622	Vallabhan	Male	14	Temple TD	Thiruvananthapuram
623	Ayyappankutty	Male	53	Temple-CD	Thrissur
624	Balaraman	Male	53	Temple-CD	Thrissur
625	Chandrashekharan	Male	46	Temple-CD	Thrissur
626	Achuthankutty	Male	37	Temple-CD	Thrissur
627	Seetha	Female	47	Temple-CD	Thrissur
628	Sivakumar	Male	39	Temple-CD	Thrissur
629	Devaswaom Girisan	Male	63	Temple-CD	Thrissur
630	Deveswom Narayanan	Male	56	Temple-CD	Thrissur
631	Deveswom Ramachandran	Male	42	Temple-CD	Thrissur
632	Devidasan	Male	35	Temple-CD	Thrissur
633	Ravipuram Govindan	Male	34	Temple-CD	Thrissur
634	Seetharaman	Male	55	Temple-CD	Thrissur
635	Sreeraman	Male	25	Temple-CD	Thrissur
636	Achuthan	Male	36	Temple-GD	Thrissur
637	Adithyan	Male	10	Temple-GD	Thrissur
638	Akshay Krishnan	Male	17	Temple-GD	Thrissur
639	Appu	Male	39	Temple-GD	Thrissur
640	Arjun	Male	16	Temple-GD	Thrissur

641	Balakrishnan	Male	32	Temple-GD	Thrissur
642	Balaram	Male	21	Temple-GD	Thrissur
643	Balu	Male	22	Temple-GD	Thrissur
644	Chandrasekharan	Male	36	Temple-GD	Thrissur
645	Chenthamarakshan	Male	21	Temple-GD	Thrissur
646	Damodardas	Male	12	Temple-GD	Thrissur
647	Devadas	Male	33	Temple-GD	Thrissur
648	Devi	Female	42	Temple-GD	Thrissur
649	Gajendra	Male	16	Temple-GD	Thrissur
650	Gokul	Male	15	Temple-GD	Thrissur
651	Gopalakrishnan	Male	45	Temple-GD	Thrissur
652	Gopi Kannan	Male	32	Temple-GD	Thrissur
653	Gopikrishnan	Male	40	Temple-GD	Thrissur
654	Indrasen	Male	35	Temple-GD	Thrissur
655	Junior Achuthan	Male	23	Temple-GD	Thrissur
656	Junior Kesavan	Male	21	Temple-GD	Thrissur
657	Junior Lekshmanan	Male	50	Temple-GD	Thrissur
658	Junior Madhavan	Male	34	Temple-GD	Thrissur
659	Junior Vishnu	Male	31	Temple-GD	Thrissur
660	Kannan	Male	45	Temple-GD	Thrissur
661	Keerthi	Male	12	Temple-GD	Thrissur
662	Kesavan	Male	38	Temple-GD	Thrissur
663	Kesavankutty	Male	41	Temple-GD	Thrissur
664	Krishna	Male	NA	Temple-GD	Thrissur
665	Krishna Narayanan	Male	17	Temple-GD	Thrissur
666	Krishnan	Male	44	Temple-GD	Thrissur
667	Kuttikrishnan	Male	60	Temple-GD	Thrissur
668	Kuttysankaran	Male	57	Temple-GD	Thrissur
669	Lekshmi Krishna	Male	34	Temple-GD	Thrissur
670	Lekshminarayanan	Female	10	Temple-GD	Thrissur
671	Madhavankutty	Male	45	Temple-GD	Thrissur
672	Mukundan	Male	28	Temple-GD	Thrissur
673	Murali	Male	30	Temple-GD	Thrissur
674	Nandan	Male	36	Temple-GD	Thrissur
675	Nandini	Female	47	Temple-GD	Thrissur
676	Narayanankutty	Male	56	Temple-GD	Thrissur
677	Navaneeth Krishnan	Male	23	Temple-GD	Thrissur
678	Padmanabhan	Male	67	Temple-GD	Thrissur
679	Parthan	Male	12	Temple-GD	Thrissur
680	Peethambaran	Male	13	Temple-GD	Thrissur
681	Prakasan	Male	45	Temple-GD	Thrissur
682	Radhakrishnan	Male	52	Temple-GD	Thrissur
683	Rajasekharan	Male	41	Temple-GD	Thrissur

684	Ramachandran	Male	66	Temple-GD	Thrissur
685	Ramankutty	Male	56	Temple-GD	Thrissur
686	Ramu	Male	42	Temple-GD	Thrissur
687	Ravikrishnan	Male	29	Temple-GD	Thrissur
688	Reshmi	Female	31	Temple-GD	Thrissur
689	Sankara Narayanan	Male	34	Temple-GD	Thrissur
690	Sathyanarayanan	Male	42	Temple-GD	Thrissur
691	Seshadri	Male	16	Temple-GD	Thrissur
692	Sidharthan	Male	29	Temple-GD	Thrissur
693	Sreedharan	Male	36	Temple-GD	Thrissur
694	Sreekrishnan	Male	10	Temple-GD	Thrissur
695	Thara	Female	54	Temple-GD	Thrissur
696	Umadevi	Female	42	Temple-GD	Thrissur
697	Unnikrishnan	Male	24	Temple-GD	Thrissur
698	Valiya Vishnu	Male	42	Temple-GD	Thrissur
699	Vinayakan	Male	40	Temple-GD	Thrissur
700	Vineeth Krishnan	Male	29	Temple-GD	Thrissur
701	Maheswari	Female	84	Zoo	Thiruvananthapuram
702	Raja (Rajkumar)	Male	30	Zoo	Thiruvananthapuram

NA: Details not available
FC: Forest Camp:
Temple KMD: Koodalmanikyam Deveswom
Temple Pvt: Temple Private
Temple Pvt BMKD: B. Madhusudhanakurup, Kangazha Devaswom,
Temple Pvt CKK: Chemboothra, Kodungalloorkavu Kshethram
Temple Pvt CTDC: Cochin Thirumala Devaswom Committee
Temple Pvt KBKC: Karuvanthole Bhagavathy Kshetra Committee,
Temple Pvt KD: Kattukulangara Devaswom,
Temple Pvt KNDK: Kunnathur Devaswom, Kuttamperoor
Temple Pvt KUKGD: Kuttankulangara Devaswom
Temple Pvt MKP: Mannar Kurattikkadu Pottambalam
Temple Pvt NSDKSSD: Nedumankavu Sree Dharamasastha Kshethra Samrakshana Samithi
Temple Pvt OLDO: Olarikkara Devaswom, Olarikkara
Temple Pvt PMTT: Puthenkavumala Mahadeva Temple, Thiruvalla
Temple Pvt PRKD: Paramekkavu Devaswom
Temple Pvt THBDYD: Thiruvambady Devaswom M. Madavankutty
Temple Pvt-SKD: Sri Kottiyoor Devaswom
Temple TD: Travancore Devaswom Board
Temple-CD: Cochin Devaswom Board
Temple-GD: Guruvayoor Devaswom

PROJECT TEAM

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Compassion Unlimited Plus Action (CUPA) is a non-profit public charitable trust registered in 1991 that works for the welfare of all animals. Since 1994, CUPA has worked in close collaboration with government departments and agencies on various projects. CUPA's mission is to protect animals from abuse and violence and do what may be required to alleviate their suffering at the hands of humans. CUPA does not differentiate among pet, stray or wild animals, since all of them may require assistance and relief from cruelty, neglect and harm. The organisation's objective has been to design services and facilities which are employed fully in the realisation of these goals.

Asian Nature Conservation Foundation (ANCF) is a non-profit public charitable trust set up to meet the need for an informed decision-making framework to stem the rapidly declining natural landscape and biological diversity of India and other countries of tropical Asia. The Foundation undertakes activities independently and in coordination with governmental agencies, research institutions, conservation NGOs and individuals from India and abroad, in all matters relating to the conservation of natural resources and biodiversity, endangered flora and fauna, wildlife habitats and environment including forests and wetlands. It participates and disseminates the procured information, knowledge and inferences in professional, academic and public fora.

Elephant Welfare Asociation (EWA): is a not-for-profit charity organization, based at Thrissur, Kerala. Since 13 years, under the expert guidance eminent elephantologists, Dr.K.C.Panicker, Dr. J.V. Cheeran, and Dr. K. Radhakrishnan, the organization is working towards ensuring welfare of captive elephants in Kerala, welfare of handlers, providing veterinary and health care and crisis management in situations involving elephants. EWA works with various government and non-government agencies to ensure elephant well-being. It undertakes capacity development programmes for owners, handlers and the public. EWA also provides literary information on elephants and its associated features, to the public, through its library which holds a collection of books, periodicals and scientific materials.

Elephant Care Centre (ECC): is a registered charitable trust founded with the objective of caring for and rehabilitating captive elephants that are physically and psychologically incapacitated to work and provides shelter to terminally ill elephants. The trust also helps in retraining "rogue" elephants, developing alternative (elephant friendly) employment sources, low cost food sources, building awareness on captive elephant issues. It is located in Palakkad district, Kerala.

World Society for Protection of Animals (WSPA) With consultative status at the United Nations and the Council of Europe, WSPA is the world's largest alliance of animal welfare societies, forming a network with 910 member organisations in 153 countries. WSPA brings together people and organisations throughout the world to challenge global animal welfare issues. It has 13 offices and thousands of supporters worldwide.

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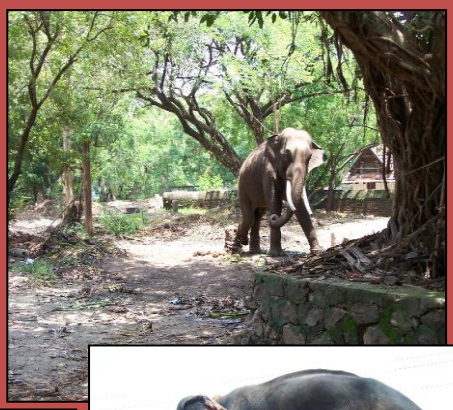
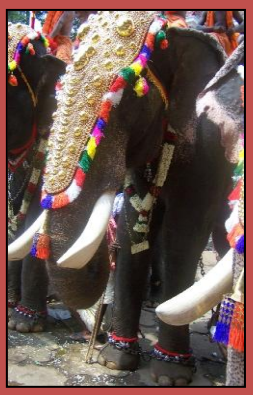
Figures 8a,b,i,j,10b,14a,e,f,20a,b,i,j,22a,b26g,28g,30a,b,30g and h: E.K Easwaran
Figure 26h: Mohandas, Figures 8k,l,16h,26i,j and back cover 9: David Abhram
Figure 27a: Kerala Forest Department
Figures:1a,b,c,d,8c,d,e,f,h,m,n,o,p,10c,d,g,h,14c,16a,c,d,22c,d,e,f,g,h,ij,m,n,26c,d,28c,d,30c,d,e,f, and back cover 15: Surendra Varma

Kerala's captive elephant population accounts for a considerable percentage of the estimated captive population in India. This investigation aimed to assess the welfare status of captive elephants and the professional experience and socio-economic status of handlers in Kerala, across different management regimes.

This investigation is based on two different approaches: first is an attempt to estimate total number of elephants in the state, and based on this, to segregate elephant distribution across ownership types. The second approach is to select about 157 elephants and assess their welfare status. The welfare was assessed based on a rating scale developed by elephant experts.





Elephant Care Centre

ELEPHANT WELFARE ASSOCIATION

World Society for the Protection of Animals