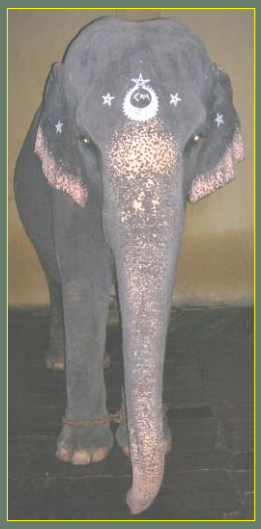
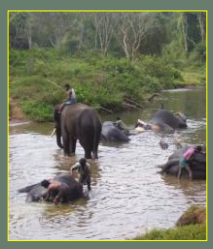
Captive Elephants of Tamil Nadu





An Investigation into the Status, Management and Welfare Significance

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Elephants in Captivity- CUPA/ANCF -Technical Report No. 5

Animal Welfare Foundation Madurai

People For Animals

WSPA World Society for the Protection of Animals

Captive Elephants of Tamil Nadu

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Surendra Varma[1], S. R. Sujata[2], N. Kalaivanan[3], T. Rajamanickam[4], M.C. Sathyanarayana[5], R. Thirumurugan[6], S. Thangaraj Panneerslevam[7], N.S. Manoharan[8], V. Shankaralingam[9], D. Boominathan[10a] and N. Mohanraj[10b]

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Preface

The state of Tamil Nadu (T.N.) is home to around 150 captive elephants, spread across four institutions: Forest Camps (FCs), Zoos, Temples and private ownership. Forest camps have a very long history of elephant keeping in this state, a relic of the British period of maintaining elephants to harvest forest wood, acting as a source for providing elephants to other institutions. FCs have only a few breeding females as a consequence of many being transferred or sold to zoos/ temples.

Regarding management of captive elephants, there is a distinct overlap between FCs and zoos, temples and private owners. FCs and zoos are run by the Forest department, Government of Tamil Nadu. Depending on needs and other factors, elephants are moved between these two institutions. Similarly, overlap in management between temples and private owner is also distinct. It is often difficult to establish ownership of elephants maintained by private owners/ temples.

Though T.N. has a very long history in maintaining captive elephants, there has been no detailed investigation into the population status, management and welfare conditions. This investigation aims to reduce this gap in the existing knowledge.

The data was processed by two approaches; the rating scale developed by the experts based on their concept of the importance of a particular parameter to an elephant, was used in section one and in some sections the welfare features or parameters have been rated on a zero to ten scale with zero representing the worst possible situation and ten implying a satisfactory state, closer to what an animal experiences in the wild. This can be further divided into the 0 to 2.4 reflecting, bad welfare conditions, 2.5 to 4.9 for poor, 5.0 to 7.4 as moderate and the values 7.5 to 10 satisfactory conditions.

The sequence of presentation of each regime is based on a decreasing order of existing welfare standards revealed by this study.

This report has four sections:

1. Deals with overall population status, management and welfare of captive elephants in T.N. The first chapter along with the executive summary also provides recommendations for the state.
2. Describes welfare status of elephants and handlers in FCs exclusively
3. Describes welfare status of elephants and handlers in Zoo exclusively
4. Describes welfare status of elephants and handlers in Temples exclusively

We would like to mention that elephant keeping, in terms of management regimes, in both T.N. and Karnataka follow similar patterns. The recommendations developed for Karnataka, with some modifications, have been used for T.N.

Welfare has been assessed across institutions through a number of parameters which have been rated on a scale identified by a team of experts. These parameters include features encountered on the ground, in addition to those identified by the experts. Mean rating for a parameter is compared with the experts' rating to indicate the extent of deviation. This deviation represents the extent of difference between what the experts consider to be the norm and what actually exists in the institution.

Each section has a detailed report on the population status, management and welfare conditions, in addition to Executive Summary. The detailed report is presented in the following sequence: introduction, objective, methodology, results, discussion and references. Depending on the needs and interests of the readers, either the executive summary or the detailed report can be referred to.

In terms of population status, management and welfare, temple ownership shows a very low welfare rating with a 60% deviation being observed from the Experts' Rating. Despite a long history of elephant keeping in temples, there has been no detailed study into the keeping system practiced. This study has looked at the ecological and biological needs of elephants and brought out the difference between what wild elephants experience and the existing state in temples.

While temple managements may have tried to rectify the problems faced by them in elephant maintenance, this is an opportunity for the management to make use of the problems identified in this study and provide solutions for better elephant management. Keeping elephants in temples will always be difficult since a natural environment is not available. Hence, keeping elephants in temples should be phased out or all such elephants brought together in one location with a suitable natural environment. The elephants can then be used for work when needed.

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Foresters –Anamalai and Teppakadu elephant camps, veterinary assistance in Mudumalai, Selvam, Driver ANCF, mahouts and cawadis from all management regime extended invaluable support in completing this investigation

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Section 1:
Captive Elephants of Tamil Nadu

Executive Summary

The state of Tamil Nadu maintains a number of captive elephants, estimated to be around 127-145. This investigation assesses the welfare status of these captive elephants and the socio-economic status and professional experience of elephant handlers in three institutions such as Forest Elephant Camps (FC), Temples and zoos. Data relating to seventy-six elephants and their handlers was collected across the three management regimes.

A team of experts rated different parameters of importance to the welfare of captive elephants. This rating was then used to assess the welfare status of elephants and mahouts/cawadis.

The age of females ranged from 0.2-71yrs while for males it ranged from 3-64yrs. Sixty percent of FC elephants had been captured from the wild with 30% being captive born. All Temple elephants had been transferred across institutions through purchase. Most Zoo elephants included rescued orphaned calves with two adult elephants being shifted from a FC.

All FC elephants were kept in natural conditions within forest areas; and Temple elephants were kept in man-made shelters with hard floors of concrete or stone, roof made of metal/ asbestos or cement concrete, kept within for 15h/day. Zoo elephants were kept in an enclosure of 0.12km^2 with natural scrub forest in the mornings and in a man-made shelter with concrete flooring at nights. Shelter was said to be cleaned daily.

River was the water source for FC elephants, 76% of Temple elephants had access to ponds/ taps/ borewells as water source. Zoo elephants used pond/ tank water for drinking/ bathing. Relatively low Mean Rating (M-R) was noticed for temple elephants with corresponding high deviation from Experts Rate (E-R). Minimum deviation from E-R was observed for FC elephants.

All FC and Zoo elephants were allowed to interact with each other for various durations (2-24h), where as Temple elephants lacked any social interaction as they were maintained singly. Minimum M-R was observed for Temple elephants (corresponding maximum deviation from E-R) as all observed elephants were not given opportunity for social interaction. Zoo elephants showed minimum deviation from E-R indicating existence of relatively more suitable conditions.

FC elephants were stall fed and allowed to free range to graze/ browse. Eight different food items was provided as stall feed, mineral mix was given for some elephants; ration chart was maintained. All Zoo elephants were allowed to graze/ browse and given stall feed; seven different food items was given, mineral mix was not given, ration chart was maintained. Except one, all Temple elephants were given stall feed only; 2-11 types of food items and mineral mix was given, ration chart usage was limited to a few Temple Elephants.

57% of FC elephants were used for work viz., as kunkie/ elephant ride for tourists /carrying fodder, food/water. Zoo Elephants were not made to work. All observed Temple elephants, except for a single adult male, were used for work; work involved standing in front of temple, participating in festivals, without food, water and shade.

Six FC elephants were in regular oestrus and they were exposed to males. The single adult female in the Zoo had been exposed to males, mating had been observed, however there were no reports of calving. Sixty seven percent of observed female Temple elephants were not in oestrus and were not exposed to males.

In FCs, diarrhoea occurred among the elephants, however all elephants were dewormed, oiling was done, some elephants were immunized against anthrax, and the weight and body measurements were recorded. Adult elephants in zoo had leg wounds from unknown causes, all elephants had been dewormed and oiling was practiced. Dung/ urine/ blood tests were done, body measurements were also taken. All observed Temple elephants were dewormed regularly, immunized against Anthrax, with body measurement said to be taken annually.

FC handlers had a mean experience of 13.4yrs of handling elephants. Zoo handlers had a mean experience of 7.6yrs in this profession and experience with a specific zoo elephant was 2yrs. Mean experience in handling elephants was 18.7 yrs for Temple mahouts.

When all M-R were pooled together, temples showed the least M-R, with FC and Zoo showing comparable M-Rs. This implies the existence of relatively poor welfare status of elephants maintained in temples.

Recommendations*

Forest camp and zoo elephants

The presence of conspecifics, natural physical environment such as river/water-bodies/ forest cover, and veterinary intervention makes forest camps the best model for elephant keeping. However, there is conspicuous lack of clarity in the objective of establishing forest camps and zoos—whether they contribute to conservation or welfare.

Good welfare status for a captive elephant is when minimum deviation is experienced in its biological and ecological needs. Wildlife conservation implies efforts at maintaining available natural resources (flora and fauna).

The importance of captive elephants to wildlife conservation can be considered to be of two types:

Direct Conservation

Back to wild

- Release of captive elephants into the wild**,** fully integrated into wild habitat, without any human interference: complete and unhindered addition to gene pool and numbers of wild elephant population
- Partially integrated: as observed currently in forest camps/ some zoos– free grazing, mating, scope for exposure to forest and its environment, but elephants' activity under human control
    - When camp tusker/s and female/s are allowed to forage in the elephant habitat, this results in breeding between wild and camp elephants. This enables genetic exchange between the two populations.

Indirect Conservation

- Well trained elephants called Kumkies (Koonkies) are being used to drive away wild rogue elephants as a conflict mitigation measure, to build confidence and create conservation awareness among the public.
- Kumkies are also used to capture and translocate problematic wild elephants from highly fragmented forest patches as a population control measure, this would otherwise not be possible by any other machinery
- Elephants in forest camps are also used for forestry operations such as uprooting lantana, removing trees fallen along roads. They can also be used to patrol the forest in areas with thick forest cover.
- Provides opportunity for scientific study of elephant biology and behaviour that would otherwise not be possible with wild elephants. The result of that research study can be used for management of elephant reserve.

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* The pattern of elephant keeping in terms of type of regimes, both Tamil Nadu and Karnataka share similarity and the recommendation presented are complementary to each other.

- Camp elephants are also used in rescuing and treating wild elephants which are in distress/sick due to human interference.
- As a means of providing awareness on nature and natural resources:
  The camp serves as a place to educate and teach students from schools and colleges about nature education and awareness.
  Tourism and education of public on wildlife through eco-tourism using elephant rides in forest areas, involvement of tourists in feeding routine of camp elephants

All activities which involve human interference in elephants' lives will compromise welfare of the animal/s as the animal/s will not be able to engage in species-typical activity of its choosing.

Welfare

Captive elephant welfare should involve provision for natural environment, scope for exhibiting natural behaviour; focus of veterinary care should be more towards preventing health problems rather than treating elephants for various recurring ailments; management should avoid unnecessary and heavy workload for the elephants, prevent unnatural work regimes, implement complete stoppage of cruel handling of elephants, link elephant and mahout welfare together as they are in constant interaction with each other, develop specific plans for both elephant and mahout welfare

Welfare options for the forest camp elephants of Tamil Nadu:

One option available for the captive elephants of Forest camps of Tamil Nadu would be release in to the wild, thereby adding to the conservation value of the region, with suitable health checks being done on the elephants.

Back-to-wild option may not be possible for Mudumalai Forest camp as there is a highway cutting across the sanctuary endangering the lives of the captive elephants. Villages occur within the forest limit which might lead to chance of conflict between elephants and local residents. Additionally, it may not be an ideal location as the number of wild elephants are known to be high in this region leading to conflict between both populations and a probable reduced survivability of the introduced population.,

For the Anamalai camp elephants, release into the wild could be feasible considering only numbers of wild elephants in that region. Human population pressure in the form of fragmentation of habitat and potential for conflict with local residents, however, may not permit implementation of back-to-wild concept.

Given this situation, the logic of keeping captive elephants in these forest camps appears to be based on a combination of indirect conservation value and welfare. Within the two camps in Tamil Nadu (Mudumalai and Anamalai), the latter camp appeared to be fulfilling the objective of partial integration of captive elephants in the wild, compared to the former.

Forest camps/institutions often house more than one elephant in (semi-) natural surroundings. The daily routine of the elephant often involves work. In general, this work is carried out under less stressful conditions than, for instance, the circus and temple elephants. Camp elephants require extensive management plans and budgets because of the presence of several elephants and animal handlers.

Space and diet

Availability of forest conditions for Forest camp elephants: We need to change the management of elephants that are tied for several hours in some forest camps, more specifically Mudumalai Camp, this is applicable for some elephants in Anamalai also. Most elephants have limited foraging movement since their feet are shackled or are tied to heavy drag chains.

Free grazing is good for both elephant and the habitat: depending on the situation, or some specific cases, all elephants can be safely let loose in the jungle for foraging, so that we can minimize impact of FCs on the habitat by way of cutting *Ficus* and other trees

Except for specific cases, elephants may be allowed to roam without hobbling. Experiments on using only drag chains may be considered, for the easy retrieval of the animals by mahouts.

Since study of elephants can be one objective of captivity, the foraging behaviour of such elephants (unfettered) can be studied (by trained mahouts) and can be of immense value to elephant biology.

Campsites should be changed periodically depending upon the availability of fodder and water. In doing this, we need to address the mahouts' requirement of accommodation, etc.

Both the forest camps in Tamil Nadu have to consider alternative campsites so that there is enough foraging material and water in different seasons as there might not be enough fodder during summer**.** This needs planning and management and should not be based on random decisions of site selection.

During summer, providing more nutritional food could be considered: green gram (*Vigna radiata*), digestive mixtures, potions, minerals, vitamin supplements, salt and jaggery (hardened balls of sugarcane -*Saccharum* sp.- juice) could be considered.

Supplements can be provided on veterinarian's advice. There are fodder lands available outside the park with the revenue department which can be used to raise some fodder crop.

Source of stall feed supply should be checked regularly for quality and pesticide contamination. This is in the light of reports of elephant deaths, including calves, in some cases.

The debate on providing cooked food and specific supplements such as jaggery to elephants needs to be critically reviewed. Specific reasons for administering a given food item(s) needs to be displayed on the ration chart. This should be a source of knowledge and a learning experience for newcomers.

When elephants are used for tourism during summer, extra food should be provided to the elephants.

Water

Perennial water source is available for both the camps; quality is contaminated in Mudumalai due to presence of villages (at some places sewage water also gets mixed with the water source), in the dry season, water flow is limited and results in low quantity and quality water available for elephants.

Regular water tests and water treatment need to be considered. During drought season, water should be released from the Pygara dam, courtesy the Tamil Nadu Electricity Board, on request from the Forest Department.

When an elephant is bathing or drinking water, it may defecate, contaminating the water source. Mahouts should make efforts to isolate the dung piles from the water-source.

No scientific observation on water consumption by individual elephants is available, resulting in lack of information on the quality, quantity and effect of cleanliness of this important resource.

Exercise and work

In camps and zoos, where elephant rides are offered or the animals are used as active tourist attractions, care should be taken to ensure that the elephants' routine is not disturbed. For example, the schedule for feeding the elephant should not be disturbed/ delayed for the convenience of tourists.

Elephants which are old, pregnant, and with calves should not be used for tourist rides, as is being done in some national parks and zoos

Work or work load needs to be planned, it may be suggested that during dry season elephants should not be made to work; more specially using elephants for tourism should prevented

It is recommended that the use of elephants for tourist ride during the summer months be lowered. Their use in monsoon is even more problematic as the ground is very slippery and makes it difficult for the elephant to walk with a load.

Patrolling or use as kunkie for conflict mitigation constitutes a better alternative activity for forest camp and national park elephants. This is to be preferred over using the elephant for tourist rides. Other activities preferred to tourist rides are weed removal/ removal of fallen logs from roads. Any work activity should not compromise the elephant's foraging or its access to food and water.

Allowing for formation of small groups of elephants within different areas of the national park/ sanctuary helps in covering the sanctuary or park more effectively, this may also help in using the elephants for patrolling the forest. This should not be done at the cost of separating established herd members (related/ unrelated).

Elephant enclosures, especially in zoos, tend to be monotonous. This is despite their large home range size. As elephants are active for 75% of the day, it is important to provide for their normal activities, e.g. dust baths, mud wallows, browsing, foraging, challenges to retrieve food, appropriate social interaction, scratching posts and other environmental enrichment and stimulation. In fact, zoos are good to keep a few retired camp elephants that are well trained, and are easy to handle and cannot forage for themselves, keeping in mind that their family structure is not disturbed or broken while shifting to zoos.

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Routine followed for the forest camps appeared reasonable: each animal was used for 4 trips/day lasting for 30 minutes each trip for one to two weeks and thus, gets rest till the next routine. The animal may be rested for 2 to 3 weeks.

Time of work: – 7 to 8.30a.m. and 4 to5.30.p.m. no compromise to be allowed in this schedule, no extra trips for any given individual animal to be permitted. This system is followed in Mudumalai, but the protocol for work in Anamalai is not based on prescribed norms, but is based on the demands, each elephant ride may go on for more than one hour, animals are used during hot hours of the day.

Immediately after the monsoon; forage is available for elephants even during work hours – but during the dry season the scope for feeding while working is limited; since elephants feed continually, tourist rides during summer may not provide opportunity to forage while working. The elephant rides should be banned during summer.

In Vandalore zoo elephant rides are not advisable during hot weather. Use of elephants for work in high temperatures affects the animal's themoregulatory mechanism, leading to possible display of aggression that may be dangerous to the visitors.

Training

Three aspects need to be considered

- Training of elephants captured from the wild
- Training of calves
- Nature of training

It appears that the established methods of training elephants captured from the wild are harsh. The entire process of bringing a wild animal under human control can be traumatic for the captured animal. Efforts have to be made to implement positive reinforcement for captured adult elephants also. There have been instances of "trust" being established between wild, free roaming animals and people. The establishment of a "relationship of trust" between the captured elephant and its human handler may be time-consuming and a long-drawn process when harsh punishment is not involved. But it is the need of the hour for the welfare of the elephant.

There are a total of 48 basic commands. Of these, about 35 commands involve only positive reinforcement; other 10-12 involve both positive and negative reinforcement with mild punishment and taps. The way the younger generation of mahouts handled elephants

in day to day practice appeared to be harsh, this needs to be investigated and changed by giving exposure and regular training and a sensitization programme.

Training of calf/sub-adults includes: weaning process, isolation, separation from mother and family group. The recommended methods are: positive reinforcement without separation from mother and in the presence of adult elephants.

This training is accomplished by providing food, treats and light taps on the elephant's legs and head in order to make him/her understand what is required. The elephant learns association of words with an action, which is then rewarded. This method is time-consuming, but is more welfare oriented than the traditional methods.

Regular training at least for a few hours, with positive reinforcement is suggested; training for basic upkeep, usage for kunkie, patrolling, timber hauling, loading or offloading animals in vehicles; weed removal, safari, habituating the animals to crowds or other elephants is important

Reproduction

While breeding may constitute a positive indicator of the health and environment of an elephant, reproduction is meaningless unless the increased numbers get an equal if not better quality of life. We also do not recommend separating individual elephants from family herds.

There is no written policy on the vision as to whether the elephants are kept for conservation or welfare. Therefore, even though reproduction is a signal of good welfare, there is no existing vision (policy) to increase or decrease population in camps.

For Tamil Nadu FCs, it is a curious case: on the one hand all available resources are found and on the other, not a single female elephant has given birth since 2005 as there are no breeding females due to past transfer of such elephants to other institutions. For instance, the 22y old female Ashwini was recently shifted from FC to Vandalore zoo. The transfer of a viable female from a suitable setting for breeding to a more restricted environment with reduced access to males is not advised.

Our data seems to suggest there are only a few breeding females in the population in Tamil Nadu. As temples maintain predominantly female elephants, most of the FC elephants have been sourced out to these places. - Henceforth the release of females from the camps will be prevented through exclusive laws.

Depending on the vision mentioned above, a policy document should be made available on elephant reproduction and the following features should be considered:

- Knowledge of oestrus cycles, mating period, calving intervals, age at first birth and number of births is important in managing the reproductive health of females.

- For males, details on musth are not available (where available, they are vague and inconclusive) for most camps in terms of time, duration, age at first musth, synchrony/asynchrony in musth and if the elephant has been exposed to females.

Veterinary care

Mudumalai FC has a veterinary care unit, including the presence of a residential veterinary doctor with experience in treating elephants, but, all these aspects are distinctly absent in Anamalai FC.

Anamalai FC needs a resident veterinarian with expertise in elephants along with sufficient veterinary care units.

Some of the problems faced in veterinary care are:

- Doctors do not have access to timely laboratory reports to enable them to take appropriate medical action. Most reports reach them after a delay of several days to one year, rendering lab results worthless.
- Veterinarians may like access to a modern, contemporary, reasonably well-equipped laboratory.
- There should be scope for veterinary research. Presently, limited funds may be available from the department. This may be insufficient for detailed investigations or follow-up.
- Government approvals for emergency testing are time-consuming and therefore valuable time needed for treating affected animals is lost.
- The department does not provide adequate welfare measures to the doctors resulting in employee turnover and frequent change of doctors. Hence, experience of such doctors is also going waste. The appointment of new doctors will result in the same cycle of learning and employee turn-over.

The following procedures need to be followed:

- Periodic health check-up.
- Blood/urine and dung sampling for routine clinical examination.
- Specific check-up for Tuberculosis. Herpes, etc.
- Routine check of feet, skin, eyes and for injuries, if any.
- Cattle, stray dogs should be removed from elephant camps and their surroundings as they can propagate diseases to elephants or in the case of dogs, they create havoc among elephants.

Equipment related to handling animals

Information on the current status of equipment such as chains, ropes and howdah is very sketchy or not critically reviewed. Equipment such as leg chain, "bedi" or collar, neck chain, etc. has to be periodically replaced. Howdah used for tourist rides should be regularly checked to ensure that it does not hurt the animal (effort can be taken to find light weight howdahs).

The use of *namdha* and *khadi* on elephants while providing rides: soft rope can be used instead of coconut based coirs; elephant grass is currently used as source *khadi*, it may increase the weight, succulent grasses are known to be light weight–used in Bandipur (for example).

Cushioning effort to be increased to reduce the pressure of *namdha* and *khadi* on the body. Leather used to prevent body scratches to be lubricated with castor oil (oil from *Ricinus communis*) everyday, and replaced as it become old and hard.

Body measurements

Weight and body measurements in relation to height, neck and chest girth and body length should be periodically measured in standard, calibrated measuring units. Measuring number of defecations, number of boluses, dung boluses per defecation, circumference of each bolus is recommended in relation to an individual elephant's age. This provides authentic information on digestion, health and nutrient uptake by the animal.

Simple body condition measures should be documented regularly like visibility of ribs, scapula and buckle cavity. These measurements are an indicator of the captive animal's health condition.

The departmental veterinarian should maintain all data in a health or medical register.

Funds

Information on this aspect is not transparent or the value of this important parameter is not clearly understood. There seems to be a delay in release of funds earmarked. In most camps there seems to be a delay in payment of wages and wage arrears. Fund allocation and dispersal should be done on a consistent and regular basis. Financial hardships of mahout/cawadis have been seen to result in misappropriation of rations meant for the elephant. This may not be true in all cases.

Elephant mahouts/cawadis

Except for permanent employees of the forest camps and zoos, who are few in number, most are daily wage workers. Employee status needs to be looked into, and improved upon, according to years of service and expertise.

New, temporary cawadis train themselves by observing and participating in group activities. Training should be consistent and offered throughout the year. The monitoring officers should grade their performance. Training should include specific classes on elephant biology, physiology and psychology, simple first-aid treatment, personal hygiene, etc. Mahouts/cawadis should be taken for inter-camp and zoo visits within or outside the state. A one- or two-day training program has little relevance. The same resources could be utilised better for the welfare of the mahouts/cawadis.

Due to frequent change of handlers, the experience of mahouts/cawadis in handling particular, individual elephants is not high. Both mahouts and cawadis show poor education level. Salaries provided are insufficient. This is true of insurance coverage as well. Consumption of alcohol seems to be high amongst both. Mahouts and cawadis are clear that their children would not join the profession. If elephant-keeping is to be

successful, certain incentives for the families of the mahouts need to be initiated. Only then would it be seen as a profession of choice and not of poverty and illiteracy.

Transfer or exchange of elephants between facilities

Several studies suggest that movement across facilities breaks social bonds, especially among females. The shifting of animals leads to disruption of hierarchy and results in related problems. It may also result in aggression towards an animal, which has been reintroduced into its own group. Transfers or relocations of elephants should be done after much thought. Necessary discussions with the mahouts and handlers need to be undertaken to avoid arbitrary and random movements, which may disrupt an elephant's emotional ties with related herd members.

There are usually some “problem” elephants in zoos and camps, brought in through confiscation or dumped by private owners or agencies unable to cope with the animal. Thereafter, these are parked in forest camps and zoos. These elephants require a different management concept with a specific and more care-oriented approach.

Specific quarantine measures—decision to allow this animal to interact with other members of the centre may be taken according to the background of the animal. Health checks and other tests should be completed without delay.

Camps are burdened with many animals coming from different sources. Government should allocate extra budget as contingency/non-planned expenditure to ensure proper care of these animals. These specific elephants often suffer due to the reluctance of the concerned department to take action on their behalf.

Establishment of monitoring committees exclusively for these confiscated/rescued/ abandoned elephants that are parked in camps and zoos needs to be looked into.

There is also clear scope for the formulation of a care facility, which is NOT necessarily a forest camp or zoo, due to the existing numbers of suffering and abused captive elephants across the states. Care centers need to be placed within a forest and close to a river. An area not inhabited by wild elephants may also be considered.

Adoption of elephant FC/zoos

It is recommended that forest camps and elephant facilities in zoos may be adopted by NGOs and other agencies that have a proven track record of being professional, knowledgeable, mature and sincere. This includes working with the concerned departments, volunteering for daily activities and maintenance of record-keeping, involvement in budget allocation and working with the concerned attendants. However, care should be taken that camps should not indirectly fall into the power of organisations with a declared or undeclared commercial intention. The department should always keep an administrative control over this.

Temple elephants

Temple elephants are individually housed with usually not more than one elephant per temple. This is the first of many unnatural conditions that the temple elephant has to deal with. Working conditions are poor. The elephants are exposed to long hours of performing unnatural behaviours like blessing and seeking alms. They are made to stand still for long periods of time on concrete, asphalt and other hard flooring and they endure a lack of exercise, space and shade in their daily working conditions. These factors make the average temple and circus conditions the worst in managing captive elephants.

Most temple elephants suffer from isolation, a lack of space in living conditions and have no arrangements for exercise, bathing, free ranging or interaction. In fact, some elephants have no proper resting place even at night since the temple premises have restricted areas. Most temples with elephants are not able to provide optimal conditions, though they may have the financial resources to do so. This is because the needs of the elephants and those of the temples are disparate.

A report by Clubb and Mason mentions:

- EAZA and AZA recommend natural substrates: sand, soil and grass in outdoor enclosures to allow for expression of natural behaviour such as dust bathing. Sand / soil should be available at all times. Also, tree stumps or boulders should be available for elephants wanting to rub their backs (p: 41).

- EAZA: Maximum of three hours of chaining in a 24-h day.

- AZA: Elephants should not be subjected to prolonged chaining, unless necessary for veterinary treatment or transport (P: 44).

Overall animal care

Space

The physical space provided to elephants in temples is completely alien to the biology of the animal. All temples have stone flooring on which these elephants stand for long durations, never getting a chance to walk on natural substrates. Due to such unsuitable flooring, over 50% of the elephants suffer from foot rot

The practice of chaining elephants in temples is universal. Even when sufficient space is available, chaining confines the animal to limited space and prevents it from accessing any of the available resources around it (food/ water/ space/ companions). Even in their man-made enclosures, ventilation is not proper. It is generally a closed concrete building with insufficient height and no windows.

> Temples should have exclusive housing with mud floors, high roofs, ventilation, and good drainage. It should be made mandatory for temples to change the floor of their elephant enclosures to a more natural earthen/ sand floor .At least during the day the animal should be kept on mud flooring or else alternative housing with mud or sand floors should be provided.

The animals should sleep on natural flooring and they should be in an area where it is possible for them to release body heat during the night

Those temples keeping elephants in areas least suited to their needs should be barred from having elephants in future.

Conditions existing at the temples need to be thoroughly evaluated before ownership is granted to applicants and the situation should be periodically reviewed by the Forest Department.

The living environment of the elephants should be properly maintained. There should be sufficient shade. Iron or asbestos sheets should not be used for roofing. Nylon ropes or chains/hobblers with spikes or sharp edges should not be used

Temple /mutt / privately owned/ circus elephants could be housed permanently in forested and river-based regions. Many such housing facilities could be created across the state.

Food and Water –

Food provided by devotees includes fruits, coconut, ghee, rice and other unnatural food (sweet, biscuits, and chocolates). This leads to obesity, indigestion, occurrence of colic and e.coli salmonella infections (unwashed hands of devotees).

Feeding of inappropriate food due to a lack of knowledge and awareness about proper nutrition often leads to severe health problems. A lack of sufficient supply of food due to faulty utilization or a lack of funds has often been observed in many private and government-owned temples.

Temples, instead of giving cooked food, may experiment with giving only natural food. However, if the animal has been habituated to eating only cooked food, a sudden change of food may affect the digestion. This system needs to be introduced gradually.

Proper diet charts need to be urgently formulated in collaboration with the Forest Department, researchers, veterinarians and NGOs, based on knowledge and expert scientific advice.

In most of the temples, water is scarce due to a lack of storage options and a lack of hygienic facilities.

Water should be provided within the housing complex. A 500 liter capacity water facility at least needs to be provided, which will enable the elephant to drink when it wants, without any restriction.

Temples need to provide potable drinking water from a river or another source of running water. A daily bath with clean water needs to be given to the elephant.

Special tanks where elephant could be made to lie down and washed should be made available; where ever possible lakes, channels, rivers should be accessible to the elephants; water also needs periodic checking for chemical or sewage contamination.

Work Conditions

Temple elephants are made to work in order to earn revenue for the temple and mahout. Coupled with s lack of knowledge and absence of guidelines, these animals get abused routinely in terms of their working conditions. Blessing devotees, in some cases from 800–2000 times a day is a burden for the elephant on festival days. Work of such nature should not be entertained.

The elephant is made to stand in the temple premises for work such as blessing devotees and/ or begging from them. This is done with the elephant standing on hard floors, being given cooked food with restricted time to eat it. There is no scope for the animal to forage.

Physical exercise is often neglected and if the elephant is walked, it is on tarred roads/ hard surfaces. Walking on hard surfaces is not recommended because of the animals' special feet structure which predisposes it to joint problems. The animal putting a lot of effort or weight on the joints leads to joint inflammation, ankylosis and fusion of joints. Wear and tear of the soles which is not protected by a hard covering is more when it walks on hard floors.

While working, temple elephants are made to stand in one place for long hours without any provision for walking. Absence of exercise makes them obese, especially considering the varied cooked food provided by devotees/ visitors to elephants.

The temple environment should be psychologically stimulating for the elephant in tune with its biological needs. Exposure to mild work like carrying small logs is suggested which provides scope for exhibiting natural behaviour like play, playing in mud or with other elephants and walking.
Cooked food should gradually be avoided with arrangements made to provide sufficient natural food instead. Also tree cover around the housing (natural vegetation) is recommended.

Among the types of work, the practice of blessing by the elephants should be treated as an offence

Health Care

Veterinary care, when present, is aimed only towards treatment of specific medical conditions and emphasis is not placed on prevention or recurrence. Presence of veterinarians, though an important component in the management of elephants, should not be over-rated. It has been a consistent observation that even with the presence of many skilled veterinarians in Kerala, the condition of the elephants continues to deteriorate in an alarming way. Medical management is also focused more towards treatment rather than prevention.

Routine health check-up for temple elephants and mahouts needs to be made mandatory. In case the CWW gives permission for ownership of elephants to

private individuals or temples, guidelines need to be formulated in advance with the medical team. This would ensure that check-ups are specific in nature and are not general clearances offered by the veterinarian as a routine procedure.

Before permission is granted for the keeping of elephants, the CWW should ascertain the availability of qualified and experienced veterinarians in the area, who would be responsible for the medical fitness of the animal.

Documentation of an elephant's health history should be made mandatory. Unnecessary deaths of captive elephants should be avoided at all costs.

Temples could be brought under two to three zones or circles and qualified veterinarians need to be appointed for each zone or circle. Providing training periodically to these doctors in forest camps and zoological gardens by experienced veterinarians should be made mandatory

Permission-giving authority

Despite the reverence accorded to them, temple elephants are most abused, often due to ignorance and a lack of guidance from the concerned departments. Since the Chief Wildlife Warden (CWW) of a state is the permission-giving authority, it is strongly suggested that the department has an obligation to see that laws are followed strictly and the well-being of the animal is ensured.

A committee constituted by the CWW should review all temples desirous of keeping elephants. The report should be submitted to the CWW before permission is granted for keeping elephants on their premises.

Periodic checks have to be made by the concerned department personnel and the veterinarian. In the absence of manpower and other resources, the CWW should not accord ownership certificates to temples desirous of keeping elephants. Majority of these temples have conditions rated as less than satisfactory for keeping captive elephants.

The term “upkeep, maintenance and housing” as stated in section 42 of the Wildlife Protection act, 1972 should be clearly defined for an elephant and standards of grading should be urgently initiated to prevent confusion amongst the inspecting personnel.

A handbook on elephant management should be created, with information on space requirements, water, nutrition and exercise requirements, information on mahout, etc. This should be easily available to all private owners and agencies.

The temple authorities often do not anticipate the effects of faulty management practices that can endanger the life of the mahout, the public and the elephants. The Forest Department should call for the assistance of experts, biologists, researchers and NGOs who should constitute a team to negotiate with the temple authorities. This will ensure that the temple authorities understand the problems and responsibilities that elephant-keeping entails.

On inspection of existing temple elephants, if norms for their maintenance fall below the required standards as defined by policy-makers, the temples should be persuaded to house them in a care center. The temple authorities should come forward to contribute towards the maintenance of the elephant.

Since elephants are subjected to high stress due to monotonous routines, a lack of interaction and being confined to small areas, the CWW should be very careful in awarding permission as per Section 42 of the Wildlife (Protection) Act 1972.

Temples should be persuaded to comply with the above recommendations on the basis that their elephants would be allowed to participate in certain seasonal temple rituals. However, the rituals should not compromise the welfare of the animal.

Keeping of elephants in temples and ensuring their welfare therein seems to be an uphill task. It is in the interest of the elephants and of the general public that no new elephants be brought under the management of temples. It would be best to phase out temple elephants over a designated period of time;

Privately owned elephants

Although very difficult to distinguish these ownerships from that of temple animals, a high percentage of animals in this regime live in a very poor environment and suffer from a lack of facilities that constitute good elephant-keeping. This group is also used for financial and commercial activities that severely compromise the animal's welfare.

Living conditions should include day-and-night shelters with earthen floors, bedding (specifically for those animals kept on concrete flooring at day and night shelters), water facilities for both drinking and bathing and also feeding as per diet charts. Records of births and deaths and the appointment of trained mahouts and veterinarians should be the norm for private elephant-keeping.

It is recommended that privately owned elephants be inspected from time to time and their environment evaluated as to the suitability of the habitat.

Records should be maintained and ownership papers withheld / revoked if the animals are being commercially exploited.

A handbook on elephant management should be created with information on space, water, nutrition and exercise requirements, mahout information, etc. and should be made easily available to all private owners.

Mahout/Cawadi welfare
Basic facilities

Most temple /mutt / private ownership / circus mahouts have no proper accommodation and no proper food and water facilities due to the negligence, ignorance or flouting of existing labour laws by both the management and the mahouts themselves. This contributes to their remaining in a very impoverished state as an underprivileged community.

Most mahouts are illiterate or have primary school education. Their children lack proper education facilities. Hence hereditary elephant-keeping may continue to result in the next generation of elephant handlers remaining illiterate.

Mahouts have no proper training methods and there are no proper recruitment procedures due to a lack of guidelines and interest in their profession.

All mahouts in service and newly recruited shall undergo the training given by the Forest Department, to obtain a license from them. Periodic training programmes for Mahouts / Elephant in-charge administrative staff needs to be given. Training should include proper handling of elephants, maintenance of personal hygiene, knowledge of elephant behaviour, health care and administration of first-aid measures.

Salary of temple mahouts has to be increased. Devotees can be invited to donate/ participate in mahout welfare by contributing to their salary / health care / children's education.

Conflict can arise between mahouts and management (owners) due to various reasons. Sometimes, ego clashes give rise to conflicts where the mahout may be insulted in front of devotees. Such situations have to be managed tactfully without creating resentment in the employee.

Social Security

Mahouts suffer from extreme poverty, financial instability and constant danger to their lives. They are usually not insured by the management.

There are no benchmarks for their work and their performance is not under any scrutiny. There are neither laws nor regulations that seem to apply to them. Due to their nature of work, they are unable to organize their labour force to the level of a workers' union.

Housing, insurance and social security should be ensured.

The importance of health checks for mahouts cannot be overstated. However, rarely have any medical check-ups been conducted or fitness criteria adopted during recruitment of mahouts. This may be due to a lack of knowledge and / or a tendency on the part of owners to cut costs.

Mahouts should be registered by the department. They should be given a professional card after a medical check-up which should be renewed periodically and the employer should be forced to take an insurance policy for them.

Management (temple and private ownership)

Owners are the link between the elephants, the mahouts and the public. Need for owner awareness of the situation of captive elephants cannot be understated. There are many issues in maintaining elephants and mahouts that are faced by the management, be it an individual owner, temple authority, or a deputed officer in government-owned temples. General recommendations to improve management are:

Documentation

- Maintenance of SR (Service Registers) for animals and mahouts, currently unavailable due to negligence and a lack of knowledge.
- Strict medical histories of the animals need to be maintained. In many cases, there is a complete lack of responsibility and interest on the part of the manager and veterinarian of an elephant-keeping facility.
- Maintenance of employee records and medical details of a mahout /cawadi and their family. This is currently unavailable due to a lack of systematic guidelines for elephant-keeping procedures.

Crisis Management

- To ascertain and judge the ability of the management to react to emergencies pertaining to the animal / mahout in day-to-day affairs. This is currently ignored due to a lack of training and knowledge.
- To evaluate medical emergencies related to an elephant. The negligence in treating early symptoms of disease, the lack of veterinary expertise and unavailability of veterinary facilities needs to be addressed.
- To establish a database of an experienced mahout pool. This database is currently unavailable. Unavailability of mahouts due to the lack of an established network is the single-most important reason for elephants suffering cruelty at the hands of inept handlers.

- Most temples have an existing Managing Committee or board of trustees, It would be ideal to recommend constituting a committee for each temple which could include a few of the Managing Committee members, the veterinarian involved, an animal welfare person , a Forest Dept person and the mahout (similar to the existing structure of Institutional Ethics committee under CPCSEA). This committee could meet once in three months and look into the welfare aspects of the animal, including permitting or regulating the use of the animal in certain festive activities.

Maintenance of records (applicable to all regimes)

Maintenance of records is a very important component of elephant management. The records can be of different kinds, starting from simple observation to complex medical and behavioural analysis. The details available in these records can play a vital role in managing both elephants and their handlers.

Manager and mahout / cawadi have to be trained on the maintenance of basic documents related to individual elephants.

There has to be mandatory maintenance of the service records of each elephant and this has to be updated regularly.

It is necessary to maintain the following records:

Animal Body measurements
Animal photographs
Health reports

Blood /urine analysis reports
Disease Treatment record
Vaccination records
Feed record
Ration/diet chart
Work schedule records

Training mahouts / handlers to observe behaviour of related and un-related elephants when they are together will help in managing the animals better, while providing a database for research.

Micro-chipping all zoo and forest camp elephants is a process that needs to be initiated urgently. This will ensure that data-keeping becomes a less cumbersome process.

Introduction

Captive elephants maintained by people do not usually have similar sets of living conditions. Different captive management regimes may prioritize different aspects: food, veterinary care, shelter space and conspecifics. Considering elephants to have not undergone domestication (Lair, 1997; Kurt and Garai, 2007), their biological and ecological needs are expected to be the same as their wild counterparts and variations in their captive living conditions may affect the well-being of the animal. The state of Tamil Nadu maintains a number of captive elephants, estimated to be around 127-145 (Ministry of Environment and Forests, 2008). Tamil Nadu Forest Department has been capturing and maintaining elephants for about 150 years. These elephants are used for jungle patrolling; weed control, eco-tourism, 'kunkie' operation, conservation education and training (Kalaivanan, 2008). The camps have only few breeding females, as (most or all) the female calves have been sold to temples or to other agencies, thus becoming an important source for elephants in temples and/or private ownership. The elephants within the camps have also been shifted to zoos, and thus become an important source of elephants for zoos in Tamil Nadu. However, there was no systematic study or survey on the status of elephants in captivity, and the current study provides basic and advanced knowledge about the welfare status of elephants kept in the captivity of the state.

Objectives

In view of the aforesaid facts the present study is designed with the following objectives.

- To assess the welfare status of captive elephants in three institutions: Forest Camps (FC), Temples and Zoos.
- To assess the socio-economic status and professional experience of elephant handlers in these three institutions.

Method

Keeping a long-living, social, intelligent species such as an elephant in captivity entails provision of features in captivity which meets the species' biological and habitat needs without overlooking the individual's requirements (Kane, *et al*., 2005). Using the knowledge gained from studies of wild elephants as a reference, captive conditions were assessed. Data was collected by body or dung measurement, observation (Fig 1a and b) and through interrogations with members in the institution (Fig 1c and d).

a

b

Fig 1a and b: Elephant body measurement and direct observation as part of data collection

The captive environment of an elephant has been separated into a number of parameters: physical/ social/ psychological, and features unique to captivity such as veterinary care/ husbandry protocol followed. Each of these parameters is made of a number of features (sub-parameters) — for instance, shelter includes shelter type/ size/ flooring/ hygiene conditions which have been rated by considering how different it is from the wild. The greater the difference from the wild, the lesser is the rating. For Veterinary parameters, availability and regularity of Veterinary care has been assessed.

The 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 specialist, wildlife veterinary experts, mangers from protected areas, those have both wild and captive elephants and other wildlife, personals from welfare organisations and elephant handlers) were invited to assess the welfare based on welfare parameters and their significance through a 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

c

d

Figure 1c and d: interactions among officials and with mahouts for data collection

- The experts, based on their concept of the importance of a particular parameter to an elephant, developed 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) was arrived for 'source of water' 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.
- Elephants were visited on the ground; data for each parameter was collected by direct observations or with the interviews of people associated the animal. Mean Rating (M-R) was calculated for a given parameter, along with its sub-parameter. 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 condition have been grouped to form a parameter. 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 regime here represent the average across related parameters observed for the regime. 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.
- 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 expert rating (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.

Result

Data relating to seventy-six elephants and their handlers was collected across three management regimes: Forest Camps, Zoos and Temples. The age of females ranged from 0.2-71yrs, while for males it ranged from 3-64 yrs (Figure 2a). The sex class distribution was biased towards males in Forest Camps (Fig2b) and in other regimes it was biased towards females.

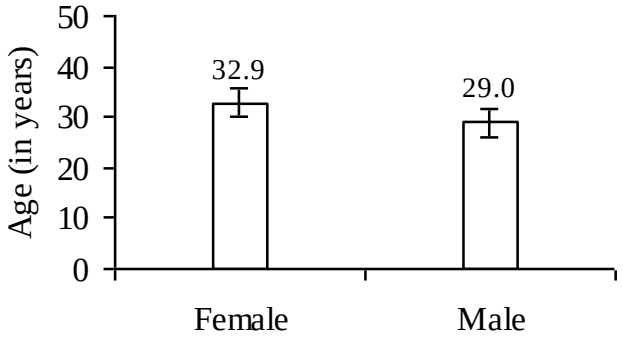
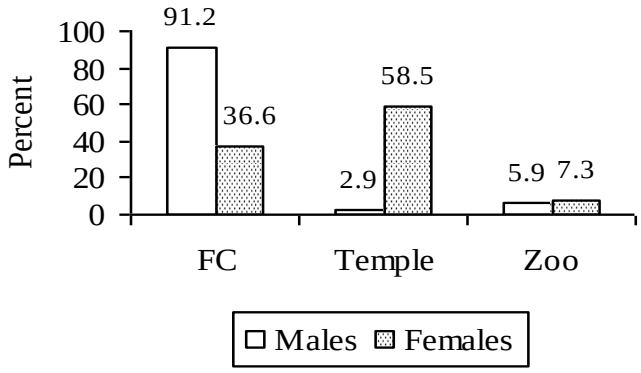


Fig 2a: Age-sex distribution across regimes



(Proportion calculated using total number of elephants of each sex across all regimes)
Fig 2b: Proportion of each sex across regimes

Source of elephant

- Sixty percent of FC elephants had been captured from the wild with 30% being captive born, 6% were rescued and 4% were received from other institutions (temples)

- Most Zoo elephants included rescued orphaned calves, with two adult elephants being shifted from a FC
- All Temple elephants had been transferred across institutions through purchase

Change of location, such as capture from a wild state/ movement from one institution to another, involves change of living conditions for the elephant. This may be a source of stress for the elephant. M-R was comparable for both temple and zoo elephants (Fig 3a and b), with variance observed for zoo elephants.

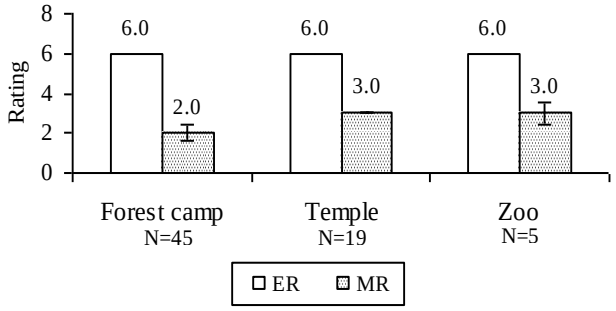


Fig 3a: Comparison of rating for source of elephants

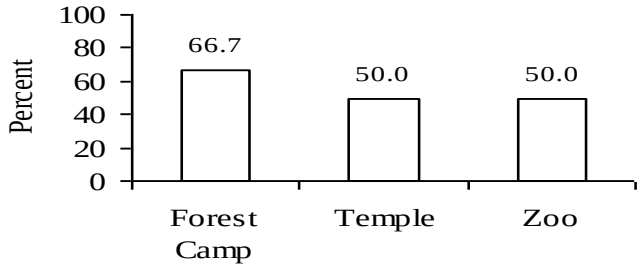


Fig 3b: Percent deviation from E-R for source

Change of mahouts

- Number of mahouts changed ranged from 0 – 8 for FC elephants
- Number of mahouts ranged from 0 -2 for Temple elephants
- For Zoo elephants, the number ranged from 0 -5.

In a free-contact system the relationship between mahouts and elephants may be positive and its breakage by change in mahouts may lead to stress among the elephants (Clubb and Mason, 2002). All the institutions showed comparable M-R for this parameter (Figure 4a and b).

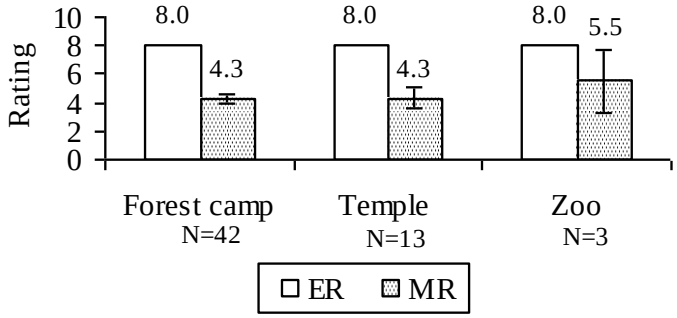


Fig4a: Comparison of ratings for mahout change

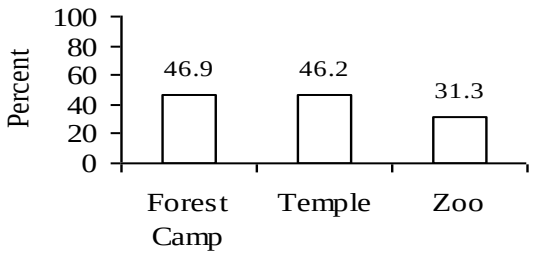


Fig 4b: Per cent deviation from E-R for mahout change

Shelter

- All FC elephants were kept in natural conditions within forest areas (Fig 5a and b); variation was observed in the practice of maintaining shelter hygiene in the two FCs observed with one FC not cleaning dung/food waste

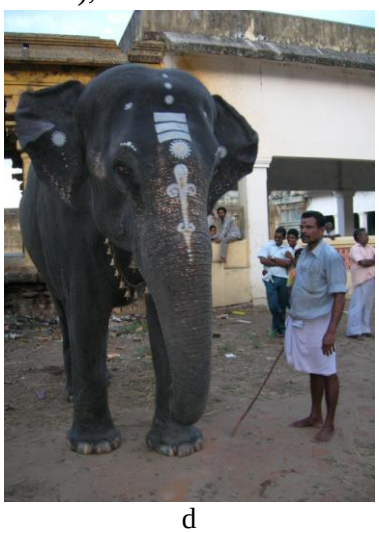
a

b

Figure 5a and b: source of shelter for Forest Camp Elephants in Tamil Nadu

- Temple elephants were kept in man-made shelters with hard floors of concrete or stone (only a few exposed to natural mud/ sand substrate), roof made of metal/ asbestos or cement concrete (Figure 5c and d), kept 15h/day (ranging from 6-24h), said to be cleaned daily once or twice

c



d

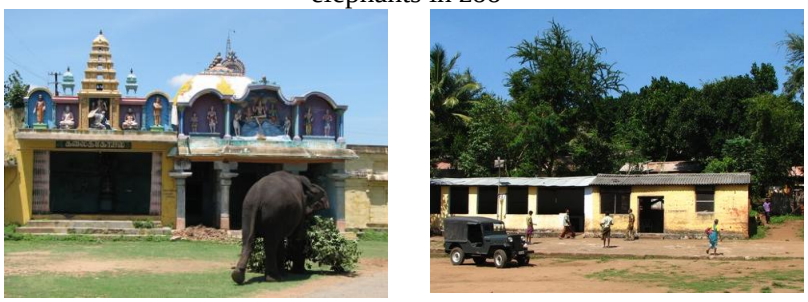
Figure 5c and d: Shelter provided for elephants in temple, note the variations in the floor provided

- Zoo elephants were kept in an enclosure of 30 sq km with natural scrub forest (Figure 5g) in the morning and in a man-made shelter with concrete flooring at night (Figure 5h) , shelter was said to be cleaned daily

Considering the vast distances traveled by wild elephants (Sukumar, 2003) in varied habitat, the shelter provided in captivity becomes integral to elephants' welfare in the context of restriction of space and provision of suitable external physical environment (vegetation types, substrate, etc). Temple elephants showed maximum deviation from E-R, among the three institutions (Figure 6a and b).

g h

Figure 5g and h: Day (g) and night (h) shelter and floor provided to elephants in zoo



e f

Figure 5e and f: Man-made shelters with roof made of concrete

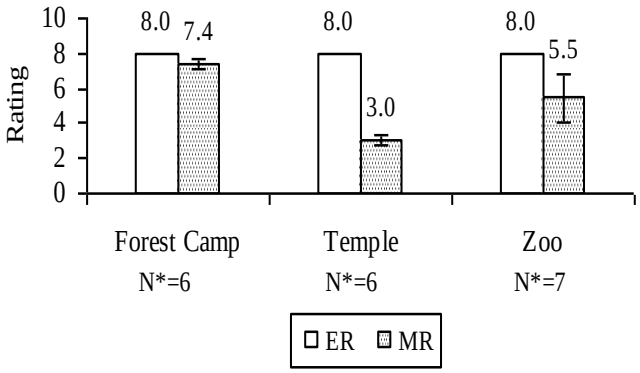


Figure 6a Comparison of rating for shelter

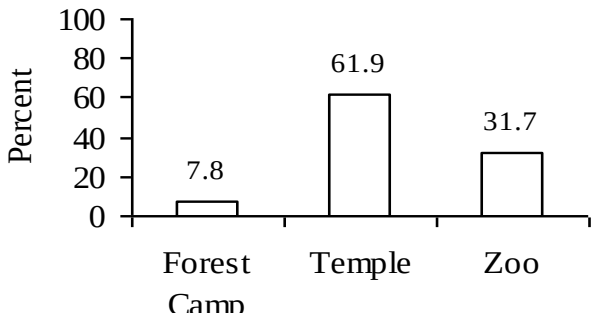


Figure 6b Percent deviation from E-R for shelter

Water

- River was the source of water for FC elephants (Figure 7a and b), the elephants were observed to drink 3-4 times a day and were bathed twice a day

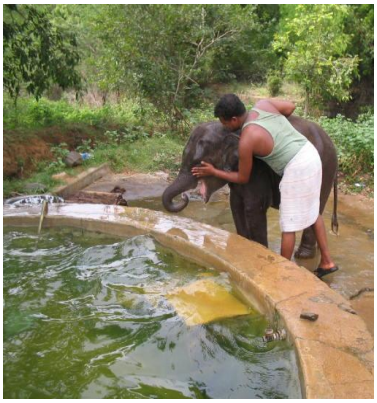
a

b

Figure 7a and b: River as source of water for drinking and bathing for forest camp elephants

- 76% of Temple elephants had access to ponds/ taps/ borewells as water source with most elephants (71%) being bathed within their shelter. Frequency of bath ranged from twice a day to once in two days, were scrubbed using brush/ broom/ a porous stone; regular water quality was not assessed or monitored.

c



d

Figure 7c and d: Source of water for drinking and bathing for zoo elephants

- Zoo elephants used pond/ tank water for drinking/ bathing (Figure 7c and d), were bathed twice a day using a brush; no water quality analyses were done

Accessibility to water sources with opportunity to perform species-typical behaviours was rated. Wild elephants are said to drink water at least once a day (Shoshani and Eisenberg, 1984), subject to its availability. Skin hydration is said to aid in maintaining thermal balance (Weissenbock, 2006).

Thus, bathing can be viewed as a practice in maintaining elephant health in view of restrictions imposed on free movement of captive elephants. In addition, Kurt and Garai, (2007) highlighted the importance of dust-baths/ wallows in maintaining skin health. In captive situations, handlers scrub their elephants while bathing. Hence, this practice has been rated. The practice of testing for quality of water was also rated.

Relatively low M-R was noticed for Temple elephants with corresponding high deviation from E-R. Minimum deviation from E-R (in comparison) was observed for FC elephants (Figure 8a and b).

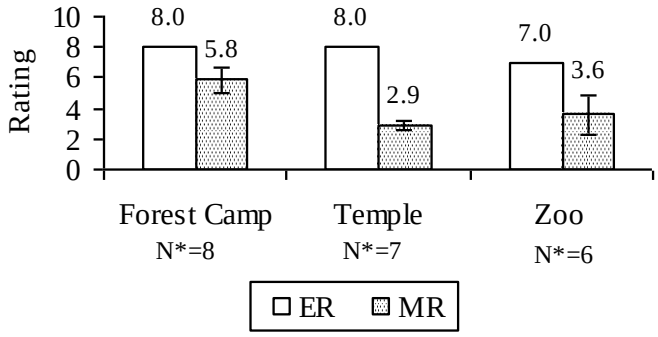


Figure 8a: Comparison of rating for water

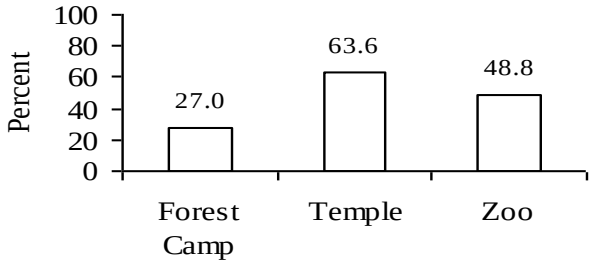


Figure 8b: Percent deviation from E-R for water

Sleep

- For FC elephants, females (along with calves, if any) were allowed to at night in the forest. It was an established practice to tie male elephants with a 10m chain at night, but this practice has been stopped and males are also allowed to free range in the forest.
- Shelter and sleeping/ resting place conditions were almost similar for most Temple elephants; two elephants were provided with natural substrate at night
- Zoo elephants were chained in their night enclosure which had concrete floors

Opportunity to sleep for a duration and in places suitable to elephants has been rated (Figure 9a and b) and the Temple elephants showed relatively low M-R; rest availability and resting place was also considered for temples. While Zoo elephants showed complete deviation from E-R (100%) more sub-parameters need to be considered to get a clearer picture.

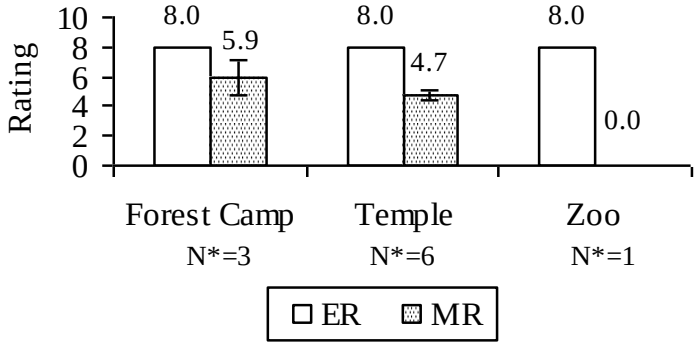


Figure 9a: Comparison of rating for sleep

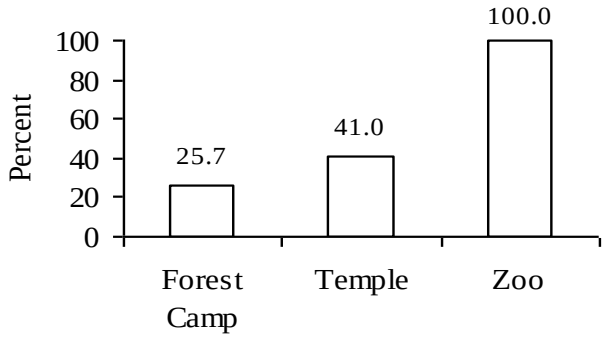


Figure 9b: Percent deviation from E-R for sleep

Walk

- All FC elephants were walked in the surrounding forest and within camp site, time of walk ranged from 9:00a.m. to 4p.m. and 6p.m. to 7a.m; male elephants in musth were chained during entire musth period
- All Temple elephants, except one adult male, were walked for various durations (1-10h), on roads for 75% of observed elephants (N=12). The adult male was said to be chained and not allowed to walk
- Zoo elephants were walked in the scrub forest for a period of 2h.

Elephants, in the wild, have been observed to have home ranges of 100-300km^2 (Sukumar, 1991). Opportunity to traverse across such vast spaces is absent in captivity. In some captive situations, the opportunity to walk may be completely denied to the elephants, being made to stand tied in one place for months.

The number of sub-parameters available for rating was few; however, even with fewer sub-parameters, temple elephants showed relatively low M-R (Figure 10a and b). In addition, variation was more for zoo elephants for this parameter showing non-uniformity in standards for the elephants.

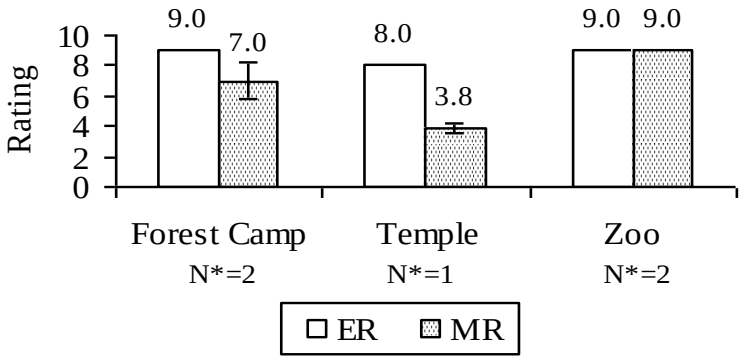


Figure 10a: Comparison of rating for walk

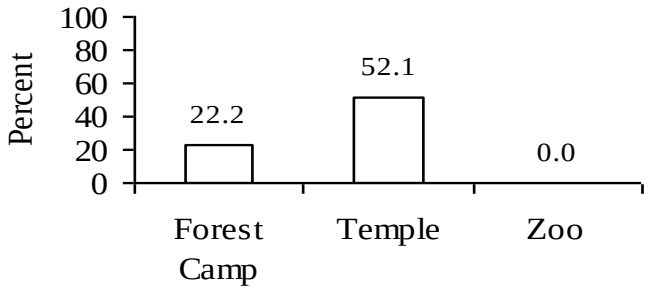
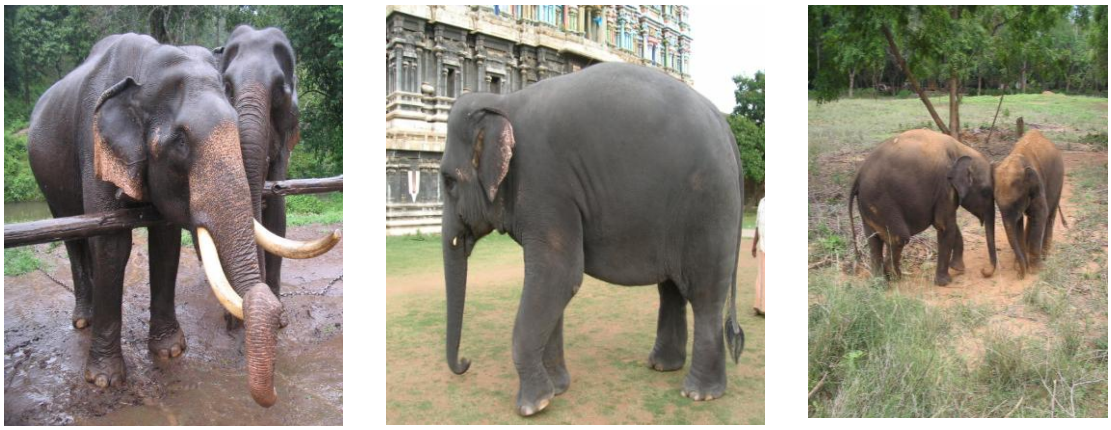


Figure 10b: Percent deviation from E-R for walk

Social interaction

- All FC elephants (except for two males and an orphaned calf) were allowed to interact (Figure 11a) for various durations (2-24h) and were within touching distance of each other.
- Temple elephants (data was available for seven) were not allowed any social interaction (Figure 11b) as they were maintained singly.
- All Zoo elephants were said to be allowed to interact, and were within touching distance (Figure 11c).
-



a b c

Figure 11a, b and c; Scope for social interaction in forest camp (a), temple (b) and zoo (c)

The complex social life of wild elephants lasting across several generations (Vidya and Sukumar, 2005) necessitates provision for social interaction with conspecifics in a captive environment. Single housing of elephants or isolation may lead to stress and exhibition of abnormal behaviour (Clubb and Mason, 2002).

Minimum M-R was observed for Temple elephants (corresponding maximum deviation from E-R) as all observed elephants were not allowed social interaction. Zoo elephants showed minimum deviation from E-R (Figure 12a and b) indicating existence of relatively more suitable conditions.

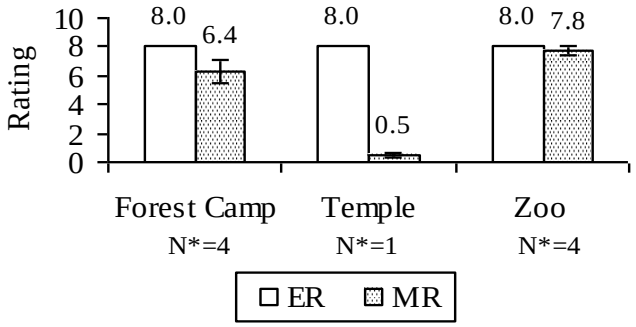


Figure 12a: Comparison of rating for social interaction

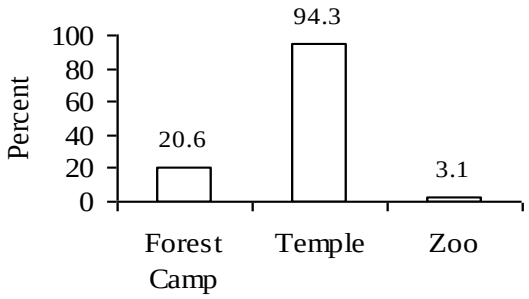


Figure 12b: Percent deviation from E-R for social interaction

Observed behaviour

- More than half (63%) of observed FC elephants were described as quiet/ reliable with an equal percentage said to be aggressive towards people/ other animals; 24% of the elephants exhibited stereotypic head-bobbing movement.
- Most of the Temple elephants were found to be calm/ quiet with two adult elephants (a male and a female) said to be aggressive towards people; stereotypic behaviour of medium to high intensity was observed.
- The behaviour of Zoo elephants ranged from quiet, frightened to playful, two female elephants (an infant and an adult) were reported to exhibit stereotypy.

Behavioural repertoire seen in wild elephants may be curtailed in captive conditions, as a captive environment is predominantly controlled by humans. In a restricted captive environment with lack of opportunity to express its species-typical behaviour, elephants may express abnormal behaviours such as stereotypy (Bradshaw, in press). Manageability of the elephants in terms of being calm/ nervous, occurrence of aggression towards people and stereotypy was rated.

FC and Zoo elephants showed comparable M-R while relatively low M-R was seen for Temple elephants (Figure 13a and b). Greater variation seen in Temple elephants was due to the occurrence of extreme ratings for two sub-parameters: observed behaviour (maximum M-R or rating same as E-R) and occurrence of stereotypy (minimum M-R).

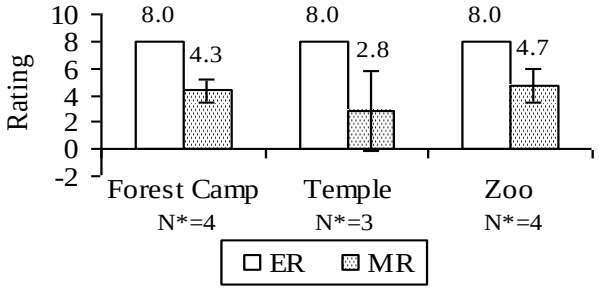


Figure 13a: Comparison of rating for behaviour

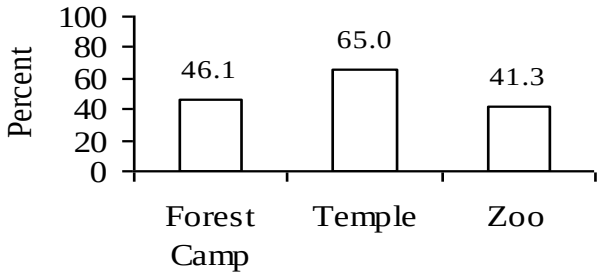


Figure 13b: Percent deviation from E-R for behaviour

Chaining

Irrespective of the management regimes, elephants were chained for one reason or the other, elephants were chained while grazing, at shelter and the length, width and size of the chain varied depending on the situations (Figure 14a, b, c and d).

- All FC elephants were shackled by their forelegs, adult males were initially tied with 10m chains at night; later they were also allowed to free range at night
- Temple elephants were chained for durations of 3-24h, with 48% of observed elephants being chained by more than one region of their body, mean chain weight was 46Kgs. The elephants spent 6-24h within an area

a b

Figure 14a, and b: Chaining of captive elephants from different management regimes; FC (a) and temple (b)

c d

Figure 14c, and d: Chaining of captive elephants with different chain types and size

- ranging from 0.688 – 920 m^2
- All Zoo elephants were chained at night and left free in the morning, chain weight was 150Kgs

Increased frequency of stereotypy has been linked to chaining of elephants (Gruber, et al., 2000); occurrence of abrasion related recalcitrant wounds caused by prolonged chaining on the elephant's body (Kurt and Garai, 2007). Temple elephants had the least M-R among all the institutions with rating for FC and Zoo elephants being comparable. M-R for all the institutions showed more than 70% deviation from E-R (Figure 15a and b).

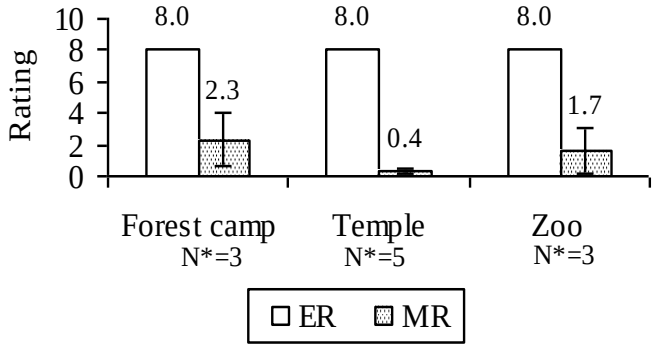


Figure 15a Comparison of rating for chaining

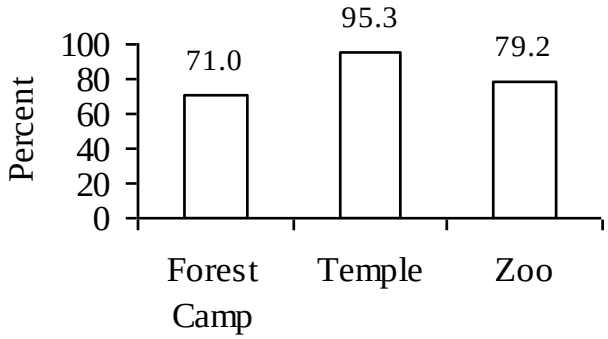
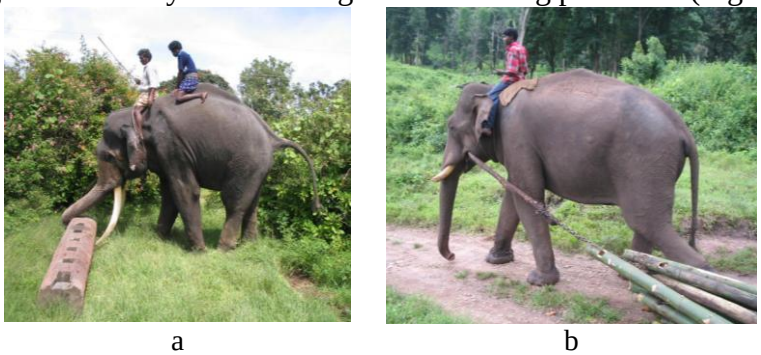


Figure 15b: Percent deviation from E-R for chaining

Work

- Fifty seven percentage of FC elephants were used as kunkie/ for tourist rides/ carrying fodder or any other work given as training processes (Figure 16a and b).



a b

Figure 16a and b: Forest camp elephants are made to do some simple work as training processes

- All observed Temple elephants, except for a single adult male, were used for work; work involved standing in front of temple, blessing devotes (Figure 16c), carrying fodder (Figure 16d) participating in festivals, with no food/ water/ shade available for two elephants.

- Zoo elephants were not assigned any kind of work.

c

d

Figure 16c and d: Work type in temple; blessing devotes (a) and carrying fodder (b) as night feed

Use of elephants for work usually involves making the animals perform behaviours unnatural to the species such as blessing/ standing in one place for long durations/ carrying tourists on howdahs, with their movement controlled by their handlers. Working conditions such as whether in a forest area/ urban setting, provision of food/ water/ rest are all factors integral to the animal's well-being. Temple elephants showed relatively low M-R among all the institutions (Figure 17a and b). However, with greater availability of data, the M-R may change. FCs showed a deviation of 25% only from E-R, even with availability of data for seven sub-parameters.

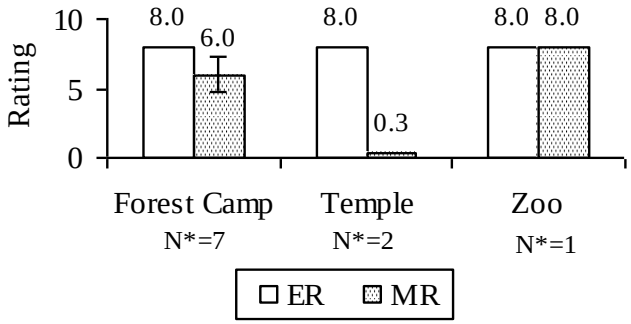


Figure 17a Comparison of rating for work

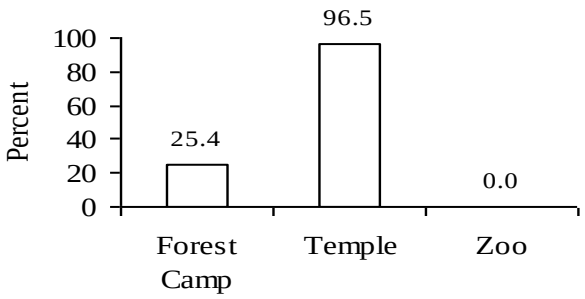


Figure 17b: Percent deviation from E-R for work

Food

- FC elephants were allowed to free range to graze/ browse and were stall fed (Figure 18a and b), eight types of food items were provided as stall feed, mineral mix was given for some elephants; ration chart was maintained.
- All, except one temple elephant, were given stall food only (Figure 18c, e and f); 2-11 types of food items and mineral mix was given, ration chart usage was limited to few temples
- All Zoo elephants were allowed to graze/ browse and given stall feed (Figure 14d); seven types of food items were given, mineral mix was not given, ration chart was maintained

a

b

Figure 18a and b: Forest camp elephants exposed to both free grazing (a, signs of feeding) and stall fed (b)

c

d

Figure 18c and d: source of food for temple and zoo elephant

e

f

Figure18e and f: stall fed; grasses and palm leaves

McKay (1973) observed elephants feeding on a range of plants, Sukumar (1991) reported on the generalist feeding habit of elephants. The range of food and ways of consuming it can be learnt while in the right environment: physical and social (Kurt and Garai, 2007). In an impoverished captive setting, the above features may be absent leading to insufficient nutrition/ no learning opportunities. For this parameter, aspects related to feeding and provisioning have been rated. Deviation from E-R was comparable for Temple and Zoo elephants (Figure 19a and b). Zoo elephants showed greater variation in their M-R due to occurrence of deviation (greater than 50%) from E-R for three sub-parameters: absence of provision of mineral mix, fewer food types and limited foraging duration.

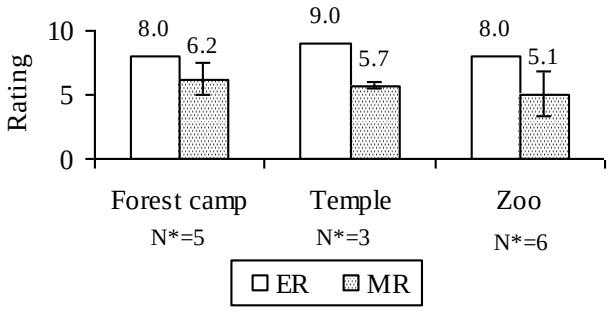


Figure 19a: Comparison of rating for food

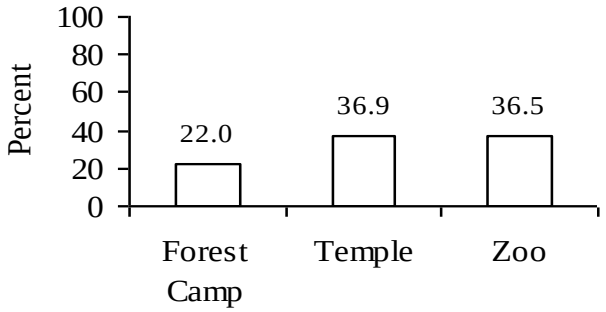


Figure 19b: Percent deviation from E-R for food

Reproductive status (Female)

- Six elephants were said to exhibit oestrus cycle in FC, status was unknown for six more. All elephants were exposed to males (Figure 20a), except two adult females, other reproductively active females have given birth to a number of calves (Figure 20b)

- 67% of temple elephants were not in oestrus, and they were not exposed to males.

- The single adult female in the Zoo had been exposed to males, mating had been observed, no reports of calving

Figure 20a: Females exposures to male

Figure 20b: Reproductively active female with her calf

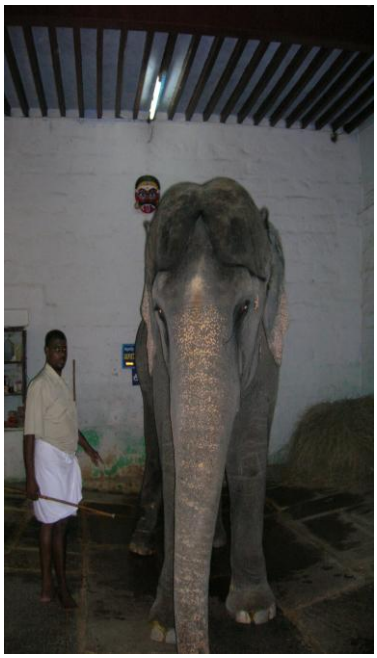
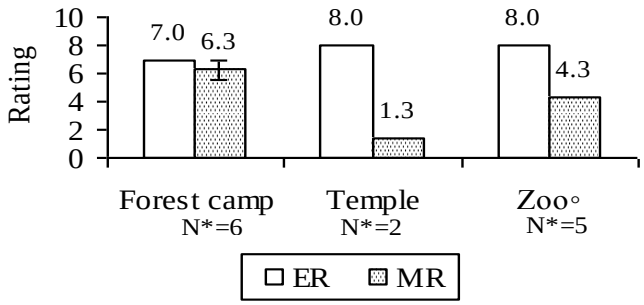


Figure 20 c and d: Non-cycling, reproductively inactive female elephants of temples

Normal reproductive functioning has been linked to physical health (Kurt and Garai, 2007). Stressors such as isolation/ harsh handling, etc., (Clubb and Mason, 2002) have been associated with poor or absent reproductive functioning. Temple elephants showed relatively low M-R, however, rating was based on two sub-parameters only. FC elephants showed the least deviation among the three institutions (Figure 21a and b).



◦: Based on single elephant

Figure 21a: Comparison of rating for reproductive status

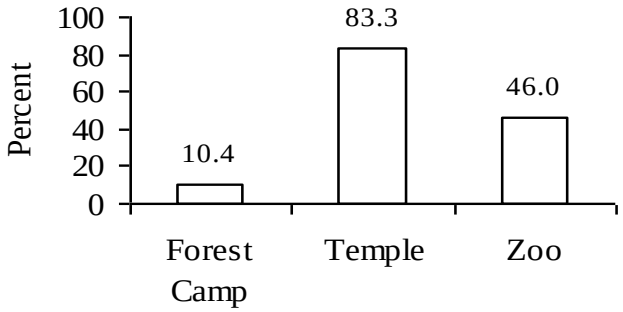


Figure 21b: Percent deviation from E-R for (female) reproductive status (female)

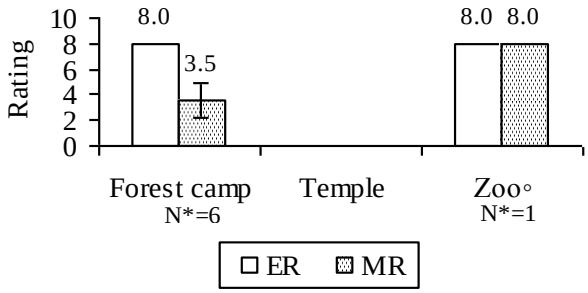
Reproductive status (male)

- All FC males except two, were said to be reproductively active (Figure 22a), seven had not sired offspring, elephants in musth were isolated/ chained, post-musth problems were in the form of infection/ injury of leg.
- The single male Temple elephant exhibited musth but data was not available on exposure to females/ calves sired (Figure 22b)
- The adult male Zoo elephant was said to be reproductively active, mating had been observed, however it had not sired any offspring

Figure 22a: One of reproductively active males of a forest camp

Figure 22b: One of reproductively inactive males of a temple

Unlike females, male elephants in FCs showed greater deviation from E-R.



◦: Based on single elephant

Figure 2~~2~~3a: Comparison of rating for reproductive status

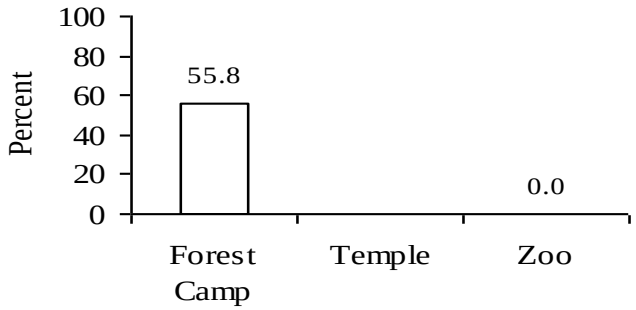


Figure 23b: Percent deviation from E-R for reproductive status (male)

Health status and veterinary routines

- In FCs, diarrhoea occurred among the elephants, two adult females were blind. All elephants were dewormed, oiling was done, and some elephants immunized against Anthrax, weight and body measurements were recorded.
- All Temple elephants were dewormed regularly, immunized against Anthrax, with body measurement said to be taken annually.
- Adult Zoo elephants had leg wounds, all elephants had been dewormed and oiling was practiced. Dung/ urine/ blood tests were done, body measurements were also recorded.

Certain diseases/ injuries are unique or occur in greater frequency in captive elephants: foot problems, tuberculosis (Mikota, *et al*., 1994). Exposure to physical conditions alien to the animal's natural living/ exposure to cattle/ close contact with people may have consequences on elephant health. The practice of regular preventive measures/ scheduled body measurement/ record keeping was also rated.

All institutions showed deviations less than 20% from E-R. However, M-R for temple elephants was based on two sub-parameters only. More information about the health status may change the M-R. Greater variation was observed in M-R of zoo elephants as two sub-parameters– disease/ injury occurrence and vaccination status showed deviation of 70-100% from E-R (Figure 24a and b).

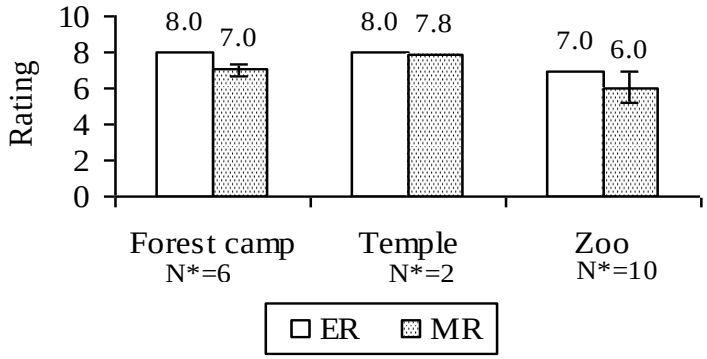


Figure 24a: Comparison of rating for health and veterinary routine

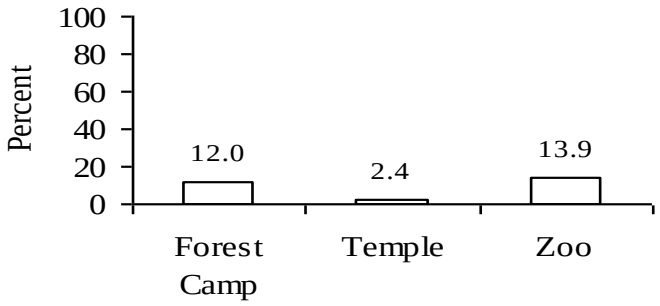


Figure 24b: Percent deviation from E-R for health and veterinary routine

Veterinary personnel and infrastructure

All FC elephants had access to a veterinarian having 5-7y experience with elephants, with veterinary assistant available for elephants in one FC only. Records were maintained, infrastructure (Figure 25a and b) such as cooking shed/ kraal/ camp site was available.

- All Temple elephants had access to a veterinarian with varying or no experience in treating elephants, most were on call, veterinary assistant was available for some elephants, records were maintained

a b

Figure 25a and b: Veterinary care facilities and record keeping in forest elephant camp

- All Zoo elephants had access to Veterinarian /assistant, and health records were maintained

Availability and access to veterinarian / assistants along with good infrastructure is integral to the effective functioning of a captive system. Minimum deviation from E-R was observed for Zoo elephants, with comparable differences seen for FC and Temple elephants (Figure 25a and b).

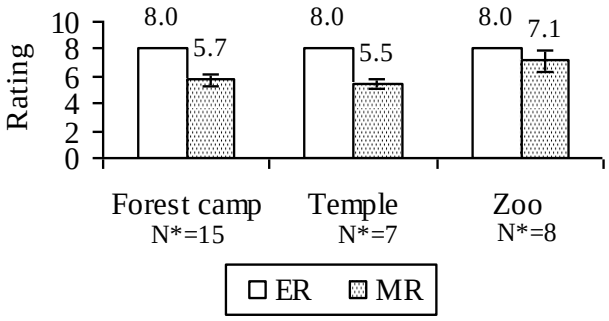


Figure 256a: Comparison of rating for veterinary personnel and infrastructure

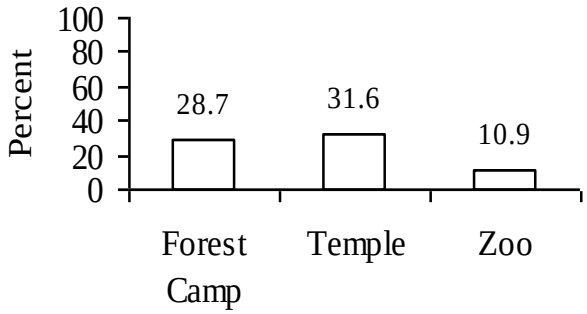


Figure 26b: Percent deviation from E-R for veterinary personnel and infrastructure

Welfare status of handlers

Mahouts/ cawadis are integral to captive situations which allow free contact with elephants. Their welfare, in terms of socio-economic status and professional experience, has a bearing on effective management of the institution.

Professional experience

The work responsibility varies across the regimes, however the handlers are also required to participate in cooking food for elephants, fetching water to the camp or site, bathing the animal; handling 'kunkie' elephants and other associated aspects (figure 27a, b, c, d).

- FC handlers had a mean experience of 13.4y (ranging from 0.5 to 37y), experience with a specific camp elephant was 6.3y (0.3 – 35y); most handlers chose this profession as it was a traditional occupation, having been trained by experience Mean experience in the profession for temple mahouts was 18.7y (ranging from 1-38y), experience with a specific temple elephant was 14.8y (ranging from 1-36y); most handlers chose it as a traditional occupation with a few opting for it out of interest, all had received training.

a b c d e

Figure 27a, b, c and d: work responsibility of handlers - Cooking (a), fetching water (b), giving bath (c), controlling elephant (d) coordinating with koonkie elephants and other elephants and controlling (e).

- Zoo handlers had a mean experience of 7.6y (ranging from 6-8y), experience with a specific zoo elephant was 2y (ranging from 1.5-2y); all had been trained by experience, knowledge of commands was good.

Experience in this profession includes not just number of years of caring for elephants: a person being with elephants out of interest may perform better than one who joins purely as an employment alternative, it also includes the training undergone for this job and his/ her knowledge of commands.

M-R for all institutions was comparable, showing more than 20% deviation from E-R (Figure 28a and b).

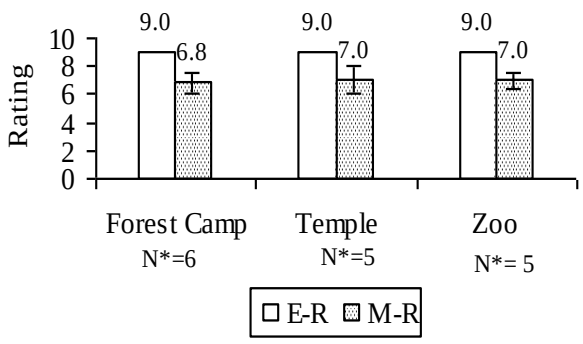


Figure 2~~6~~8a: Comparison of rating for professional experience

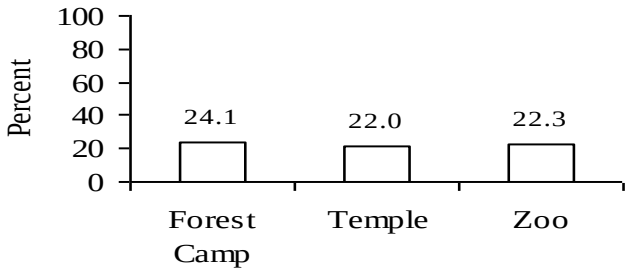
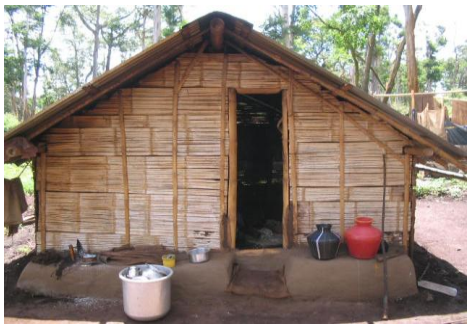


Figure 28b: Percent deviation from E-R for professional experience

Socio-economic status

- All FC handlers reported handling elephants as a family occupation, most had studied upto the 5th standard; mean salary drawn was Rs.51,591/-annum with number of children ranging from 0-8 per family, only 36% handlers were covered by insurance, 43% were reported to consume alcohol.
- For 78% of Temple elephant handlers it was a family occupation, education varied from 4th standard to B.Com, annual salary was Rs. 12902/- ranging from (Rs.400-Rs. 48,000/-), number of children ranged from 1-4
- All Zoo handlers belonged to tribal communities, with handling elephants listed as a traditional occupation, education ranged from 1st to 9th standard, mean annual salary was Rs. 40,560/- with number of children ranging from 2-3 per family, no insurance cover was available

Welfare of handlers is directly linked to his/ her socio-economic status. Handlers' M-R was comparable across regimes. However the living conditions and other aspects related to it have to be improved in a larger extent across the regimes (Figure 29a and b)



a

b

Figure 29a and b: Housing facility provided to mahouts in forest camps

However, the socio-economic status of temple mahouts/ cawadis showed greater deviation from E-R implying need for greater improvement in their status (Figure 30a and b).

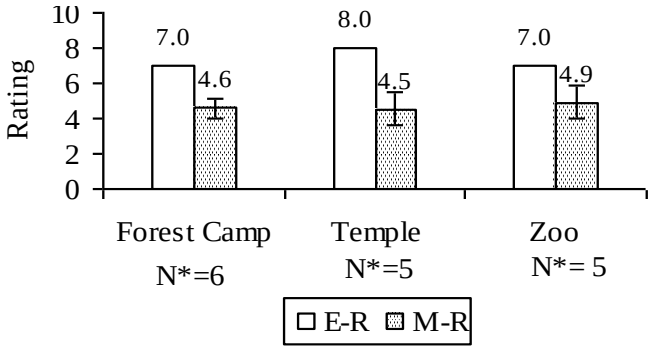


Figure 30a: Comparison of rating for socio-economic status

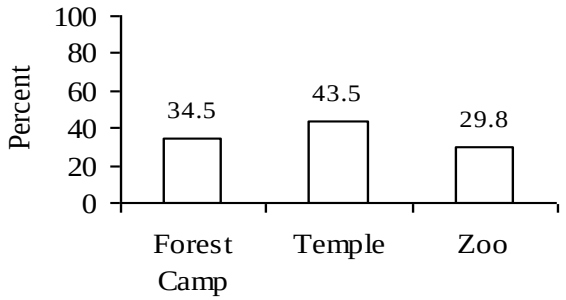


Figure 30 b: Per cent deviation from E-R for socio-economic status

Comparison of welfare status across regimes

When all M-Rs were pooled together and an overall M-R was obtained for each regime, temples showed the least M-R, with FC and Zoo showing comparable M-R. This implies the existence of relatively poor welfare status of elephants maintained in temples (Figure 31a and b).

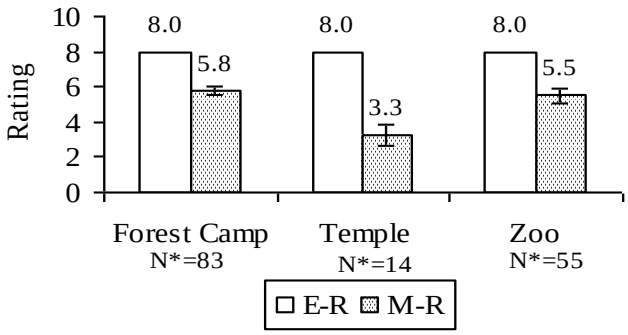


Figure 31a: Comparison of overall M-R with E-R across regimes

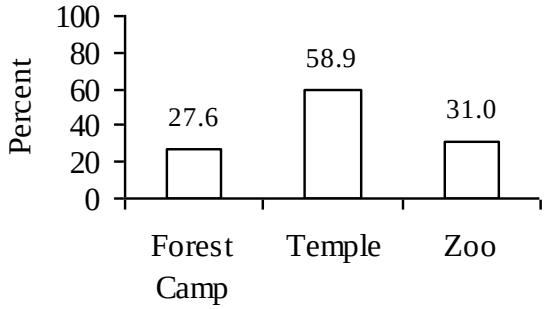


Figure 31b: Percent deviation of overall M-R from E-R across regimes

Discussion

Poole and Granli (in press) use their knowledge of wild elephant behaviour to state the need for captive environments to provide for expression of a range of species-typical behaviours in a natural setting with provision for physical and mental activity of its animals. Forest camps and the single zoo studied showed comparable deviation from E-R. Both institutions provided vast space, free ranging opportunity, presence of conspecifics and opportunity to interact. Their veterinary care was also very good with most facilities being available.

However, some features not conducive to elephant welfare were:

- Chaining of elephants: for FC elephants, both forelegs were shackled while free-ranging; Zoo elephants were chained at night in their night enclosure
- Chaining is known to restrict movement and has been observed to increase frequency of stereotypic behaviour (Gruber, *et al*., 2000).
- Change of mahouts needs to be supervised: the formation of a bond between elephant and handler is an important feature of its psychological well-being
- For Zoo elephants, greater opportunity to free range in their day-time enclosure without restricting their movement to daytime hours only would help in providing a more physically and mentally stimulating environment by providing opportunity to forage and explore.

Temple elephant's captive environments were devoid of features basic to the elephants' needs:

- Maintenance of single elephants, without opportunity for social interaction with conspecifics
- Provision of unsuitable, unnatural shelters without any chance to free range
- Provision of water facilities not conducive for the expression of species-typical behaviours
- Restriction through chaining to limited space, with opportunity to exercise by walking on tarred, unsuitable surfaces
- No free-ranging to browse/ graze in areas with diverse vegetation, only stall feeding

The death of one Temple elephant, Angayarkanni, 38y, female, was reported at the time of preparation of this report. Mariappan, 18y, single male, had been chained for months due to his aggressive behaviour.

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Section 2:
Captive elephants in Forest camps

Executive Summary

Tamil Nadu Forest Department has been maintaining elephants in their forest camps (FC) for about 150 years. The elephants are used for jungle patrolling; weed control, eco-tourism, 'kunkie' operation, conservation education and training.

The main objective of this investigation is to understand the population and management status of the both elephants and their handlers, through the assessment of the welfare status of elephants maintained in forest camps and the assessment of the socio-economic status and professional experience of elephant handlers (mahouts/ cawadis).

A team of experts, from wildlife biologists to welfare activists, rated different parameters of importance to the welfare of captive elephants and this rating was then used to assess the welfare status of elephants and mahouts/ cawadis. A mean rating (M-R) 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.

Twenty-eight elephants (62%) of the forest camps had been captured from the wild, while 14 (30%) were captive born. Mean rating (M-R) for this parameter was 2.0 with a deviation of 66% being observed from the Expert's rating (E-R). FCs showed a range in the number of handler changes from 0 – 8 per animal. M-R was 4.2 with a deviation of 47% from E-R.

All the FC elephants were maintained in natural conditions with an adjacent protected forest area with access to natural shade. M-R was 7.4 with a deviation of only 8% from E-R being observed. All the elephants had access to a river within close distance of the camp. The elephants were bathed twice a day in the river for 0.5 – 1.5 h. M-R was 5.8 with a deviation of 22% from E-R.

Except three (an adult male, an orphaned infant female and a 4y old male, all elephants were given opportunity to interact; the interaction time varied from 2 – 24 h. Number of individuals ranged from 1-20, each FC had three mother-offspring pairs; the number of related individuals across both camps was nine. M-R was 6.4 showing a deviation of 18% from E-R.

Fifty seven percent of the elephants were not used for any work, and work type involved carrying tourists/as Kunkie/ carrying firewood/ its fodder/ weed removal. M-R was 6.0 showing a difference of 25% from E-R (Figure 10a and b).

All elephants, except for the orphaned female elephant, were allowed to free range, stall feed included: Ragi (*Eleusine coracana*), Horse gram (*Dolichos biflorus*), Rice (*Oryza sativa*), Coconut (edible part of *Cocos nucifera*), Salt, Jaggery (Sweet extract from sugarcane), mineral mix, sugar cane (*Saccharum* sp.), bamboo (Bambuseae tribe) leaves; mineral mix not provided for Anamalai FC elephants. M-R was 6.2 with a deviation of 22% from E-R.

Mother-offspring pairs were present in both FCs, with a total of nine related individuals across the camps. Except for two adult males, all others were reproductively active; seven adult males had not sired offspring. M-R for female reproductive status was 6.3 showing

a deviation of 15% from E-R.M-R for male reproductive status was 3.5 with a difference of 57% being observed from E-R.

Occurrence of diarrhoea observed in some elephants, anemia in one elephant and all elephants said to be dewormed regularly for Mudumalai FC. Mudumalai elephants immunized against Anthrax once a year and the elephants were subjected to oiling of cuticle/ nails twice a day. Weight taken once in three months and body measurements once a year for Mudumalai FC elephants. M-R was 7.0 (SE= 0.3, N=12) indicating a difference of 6% from E-R.

Each FC had access to a veterinary doctor with 5-7 years experience in handling elephants, and the doctor with Mudumalai FC was at the camp itself, hence, visits were daily. For Anamalai FC, the doctor was on call, located 100 Km from the camp site. M-R was 5.7showing a deviation of 29% from E-R.

Mean age of the handlers of FC was 37.9 yrs. with age ranging from 18-55 yrs and the mean experience in the profession was 13.4 yrs, ranging from 0.5 to 37 yrs. Mean experience with a specific camp elephant was 6.3 yrs. ranging from 0.3 – 35 yrs. M-R was 6.9 showing a deviation of 24% from E-R

Most handlers reported handling elephants as a family occupation and the mean wage was Rs.51, 591/- annually ranging from Rs.14, 400/- to Rs. 1, 22,424/- one lady mahout worked voluntarily. Only 36% of the mahouts/ cawadis were insured, with self as the source of funding. M-R for the socio-economic status of the handlers was 4.7 indicating a deviation of 32% from E-R

Overall M-R for elephant welfare status for the forest camps in Tamil Nadu was 5.9 showing a deviation of 24% from the overall E-R. Deviations of less than 40% from E-R, accounted for 69% occurrence among all differences observed. The availability and access to forest areas in the presence of conspecifics, with opportunity to interact and free range, ought to provide the basic framework for a suitable captive environment. This was available for both FCs.

Introduction

Captive elephants were worked by the authorities for timber hauling and related tasks during the British period in Madras presidency (Krishnamurthy and Wemmer, 1995), having a long history of maintaining elephants in captivity (~140y: Taylor and Poole, 1998). With the ban on extraction of forest produce, addition to the captive elephant population has been from capture of wild elephants perceived to be a source of conflict with people/ from birth of elephants in captivity/ as a result of rescue from other institutions maintaining such elephants. Tamil Nadu Forest Department has been maintaining elephants for about 150 years. The elephants are used for jungle patrolling; weed control, eco-tourism, 'kunkie' operation, conservation education and training (Kalaivanan, 2008). The present system of management reflects a mixed legacy of traditional and colonial influences. This continues to evolve with present-day modern practices. Currently, the forest camps have males and there are only few breeding females, as the female calves have been sold to temples or to other agencies.

Objective

The main objective of this investigation is to understand the population, management and welfare status of both the elephants and their handlers. Hence, this report aims to:

- Assess the welfare status of elephants maintained in forest camps of the forest department, Tamil Nadu
- Assess the socio-economic status and professional experience of elephant handlers (mahouts/ cawadis)

Method

Ferrier (1947) opined that the care of elephants in captivity should be based on providing conditions that are similar to those experienced by the animals in the wild. Elephants cannot be considered to be domesticated (Lair, 1997); keeping these animals in conditions decided and completely controlled by people may affect the well-being of the animals. Data was collected through observations of elephants/ interviews with relevant personnel in the institution. Related data such as shelter type/ size/ floor type were grouped together to form a parameter with each individual constituent data termed as a sub-parameter. Welfare status of the 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 is the welfare. Deviation from the wild state for the parameters observed was rated using a scale developed by elephant experts.

The 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 specialist, wildlife veterinary experts, mangers from protected areas, those have both wild and captive elephants and other wildlife, personals from welfare organisations and elephant handlers) were invited to assess the welfare based on welfare parameters and their significance through a 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 the importance of a particular parameter to an elephant, developed rating for each parameter. For example mean expert rating

f 8.0 (SE= 0.5, N=29) for a parameter 'floor' and 9.0 (SE=0.4, N=31) was arrived for 'source of water' 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.
- Elephants were visited on the ground; data for each parameter was collected by direct observations or with the interviews of people associated the animal. Mean Rating (M-R) was calculated for a given parameter, along with its sub-parameter. 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 condition have been grouped to form a parameter. 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 regime here represent the average across related parameters observed for the regime. 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.
- 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 expert rating (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.

Result

Data was collected for 47 elephants (31 males, 15 females, and one calf -unknown sex) belonging to two Forest camps (FC): Mudumalai FC, Mudumalai and Anamalai FC, Pollachi, Tamil Nadu. Male elephant age ranged from 3 – 62yrs, while female age ranged from 0.2 – 71yrs (Figure 1).

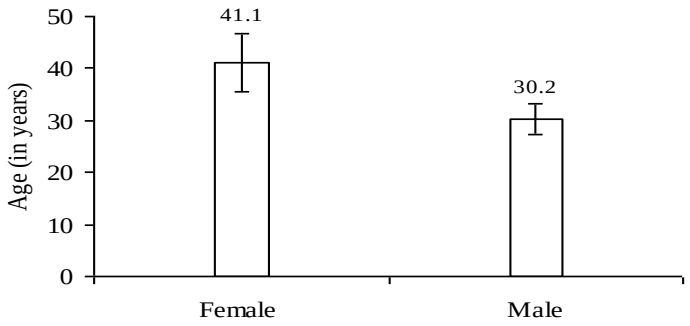
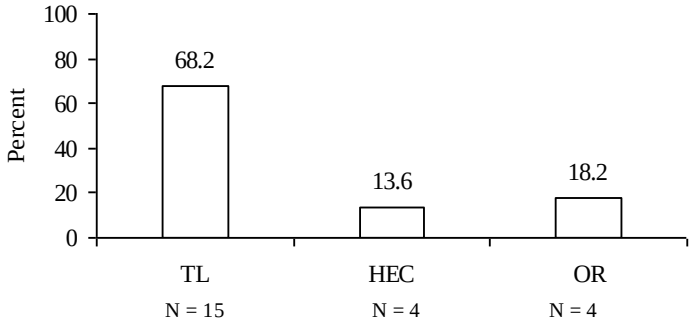


Figure 1: Mean age of FC elephants

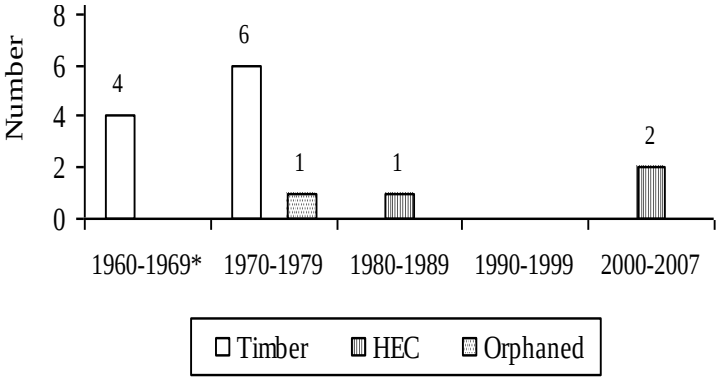
Source of elephants

Twenty-eight elephants had been captured from the wild (Figure 2a and b), while 14 were captive born within the FCs, three were rescued/ orphaned and two had been received from temples. A cause of greater stress would be the capture of wild elephants. Hence, this parameter was rated. Mean rating (M-R) was 2.0 (SE = 0.41, N = 45) with a deviation of 66% being observed from the Expert's rating (E-R).Conditions to which the captive elephant is exposed to may change following transfer across locations/ institutions.



TL: Timber logging HEC: Human-elephant conflict OR: Orphaned

Figure 2a: Reasons for capture from wild



*: includes data from 1958 also
HEC: Human-elephant conflict

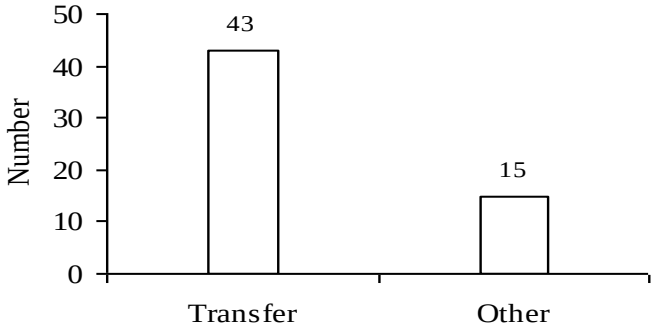
Figure 2b: Reason for capture from wild (year-wise distribution)

Purpose of keeping

Use of elephants for work and consequent exploitation of the animals may be associated factors (Kurt and Garai, 2007; Krishnamurthy and Wemmer, 1995). Low rating reflects this philosophy of overexploiting captive elephants at the cost of their welfare. M-R was 8.0 (SE = 0, N = 45) implying no commercial interest in the elephants. 100% congruence was observed with E-R for this parameter.

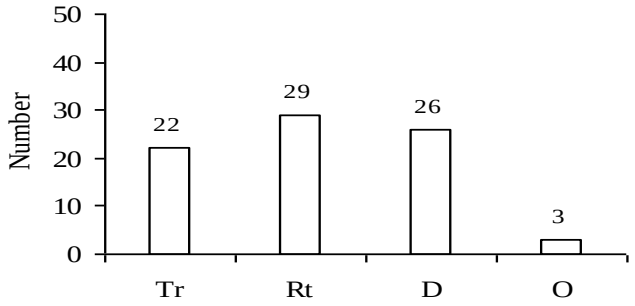
Change of mahouts/ cawadis

Frequent change of handlers may have a negative effect on the elephant, as each change is accompanied by breakage of a bond between mahout and elephant (Panicker, 1998). FCs showed a range in the number of handler changes (Figures 3a and b): from 0 – 8 per animal. M-R was 4.2 (SE = 0.4, N = 42) with a deviation of 47% from E-R.



(Other: Trainees) Transfer in first bar (of graph) refers to mahout

Figure 3a Reason for change in mahout per elephant



Tr: Transfer Rt: Retired D: Death O: Others
Other: Transfer of elephants/ death/ calves growing up/ calves being brought in)

Figure 3b: Reason for mahout working with more than one animal

Shelter

- All the FC elephants were maintained in natural conditions with an adjacent protected forest area with access to natural shade .
- When the elephants were tied at night, they were kept in the open with earthen flooring.
- In one FC, Mudumalai, excess food and excreta was observed to accumulate in the camp site. The other FC was said to maintain cleanliness.

Attributes of the living space forms an important part of a captive elephant's life with unsuitable flooring/ absence of shelter affecting the animal. M-R was 7.4 (SE= 0.3, N = 6) with a deviation of only 8% from E-R being observed (Figure 4a and b).

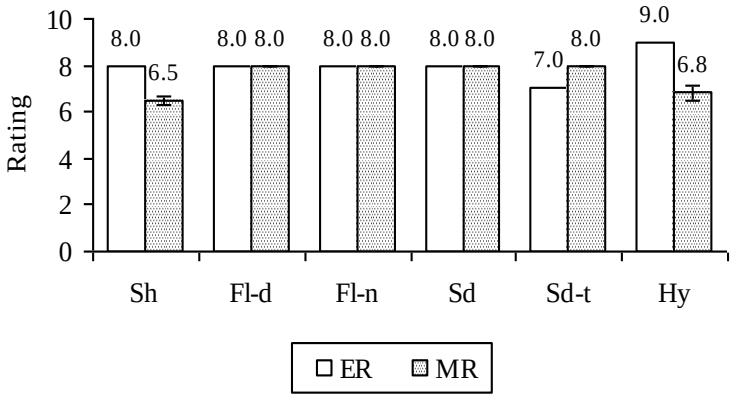
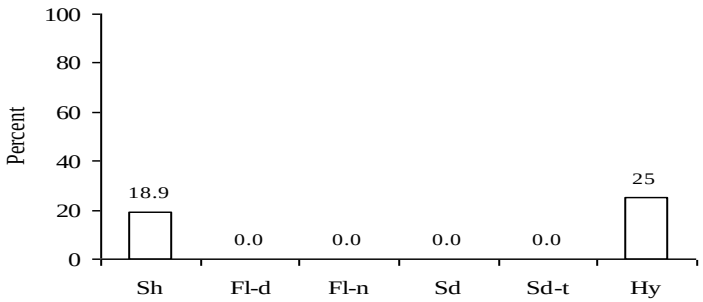


Figure 4a: Comparison of M-R and E-R for 'shelter' sub-parameters



Sh: Shelter
Fl-d: Flooring (day)
Fl-n: Flooring (night)
Sd: Shade availability
Sd-t: Shade type
Hy: Hygiene maintenance

Figure 4b: Percent deviation from E-R for 'shelter' sub-parameters

Water and its use by elephants

- All the elephants had access to a river within close distance of the camp.
- The elephants drank 3-4 times/ day (from 36 – 80 liters per day)
- Water was tested, annually, for quality in Mudumalai only; the river in Mudumalai was said to be polluted by sewage; quantity available for use was less in summer.
- The elephants were bathed twice a day in the river for 0.5 – 1.5h using "thalai" brush (Mudumalai) or nylon brush (Anamalai).

Availability of running water, accessibility to the elephants when it needs to drink/ bathe, conducting tests of water quality was evaluated. M-R was 5.8 (SE= 0.8, N = 8) with a deviation of 22% from E-R (Figure 5a and b).

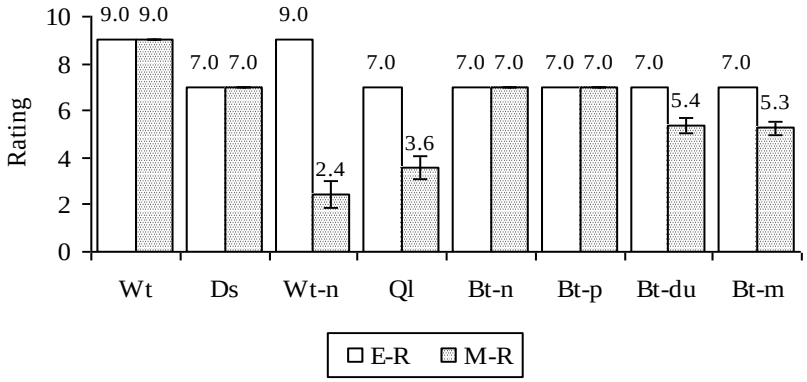
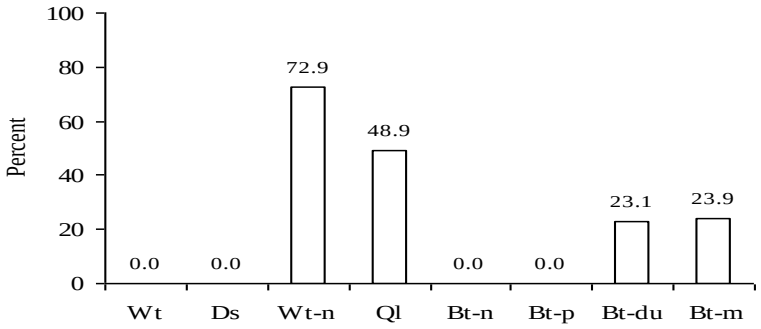


Figure 5a: Comparison of M-R and E-R for water sub-parameters



Wt: Availability of perennial source of running water
Ds: Distance to water source
Wt-n: Number of times they drank water
Ql: Water quality tests
Bt-n: Bathed (number of times)
Bt-p: Bathing place
Bt-du: Bath duration
Bt-m: Bathing materials

Figure 5b: Percent deviation from E-R for 'water' sub-parameters

Sleep

- Females with their calves were allowed to free range in the surrounding forest. Males were tied with 10m chains near the camp. It should, however, be noted that the practice of chaining males has been discontinued at the time of writing this report
- Sleep duration ranged from 1-4h at night

Adult elephants sleep for 3-4h at night (Kurt and Garai, 2007), with infants sleeping in the day/ night. The opportunity to free range in forest conditions enables the animals to select suitable space/ time for this activity.

Rating has been designed to reflect this aspect of their biology. M-R was 5.9 (SE=1.2, N=3) showing a deviation of 26% from E-R for this parameter (Figure 6a and b).

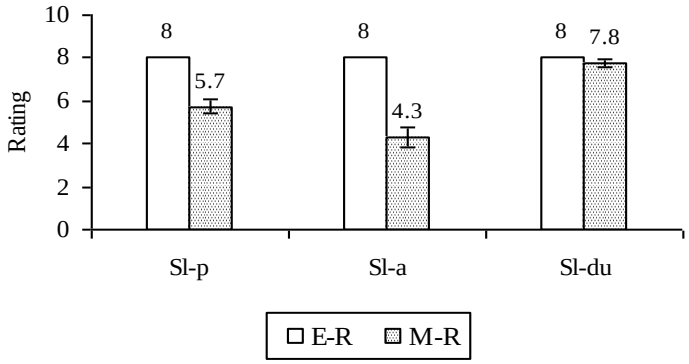
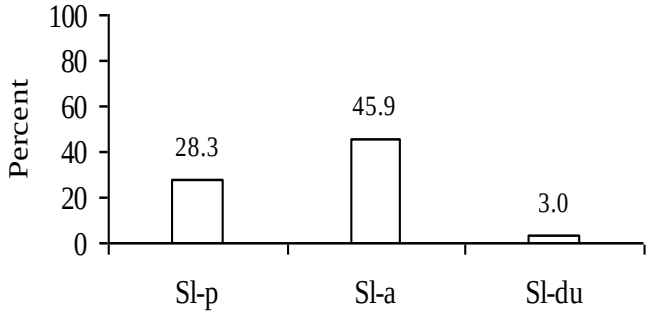


Figure 6a: Comparison of M-R and E-R for 'sleep' sub-parameters



Sl-p: Sleeping place Sl-a: Sleeping area Sl-du: Sleep duration

Figure 6b: Percent deviation from E-R for 'sleep' sub-parameters

Walk

- All the elephants were walked within the camp site and in the surrounding forest
- Time of walk ranged from 9:00a.m. to 4p.m. and 6p.m. to 7a.m.; orphaned infants: 7:30a.m., 11:30 a.m. and from 3:00 p.m. to 5:00 p.m.

Wild elephants are said to be active for nearly 80% of a day (Kane, et al., 2005), foraging across several kilometers. Keeping this in context, walking was rated for captive elephants. Opportunity to walk on suitable terrain (natural/ earthen/ across varied habitat) was given high rating. Deviation from E-R was 0% for the sub-parameter 'walk' and 38% for the sub-parameter 'Time of walk' (Figure 7).

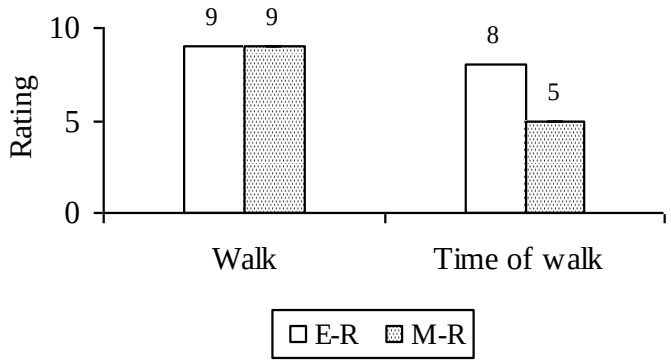


Figure 7: Comparison of M-R and E-R for 'walk' sub-parameters

Social interaction

- All, except three, elephants were given opportunity to interact; one adult male, a 4 year old male and an orphaned infant female were not allowed interaction
- Interaction time varied from 2 – 24h
- Number of individuals ranged from 1-20
- The animals were within touching distance
- Each FC had three mother-offspring pairs; the number of related individuals across both camps was nine

The complex set of interactions in elephant society is well-known (Sukumar, 2003, Poole and Moss, 2008). Opportunity to interact with other elephants in groups including a combination of age/sex was given high rating. M-R was 6.4 (SE=0.8, N=4) showing a deviation of 18% from E-R (Figure 8a and b).

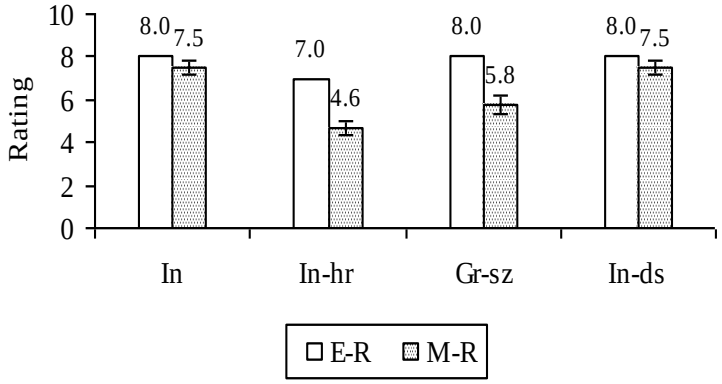
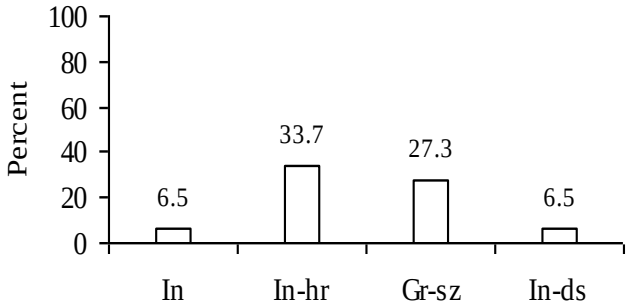


Figure 8a: Comparison of M-R and E-R for 'social interaction' sub-parameters



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

Figure 8b: Percent deviation from E-R for interaction sub-parameters

Observed behaviour

- 63% of the elephants were described as quiet/ reliable with 35% said to be undependable/ nervous/ easily frightened
- 63% of the elephants (both males and females) were said to be aggressive: either towards other elephants/ animals or people

- 35% of the elephants had exhibited aggression toward people (all males)
- 24% elephants exhibited stereotypic head bobbing movement (of low to medium intensity)

Captivity enforces conditions which prevent independent exercise of choice by the elephants, dependent as they on their human benefactors for many resources/ time (Bradshaw, in press). Deviations from normative behaviour in the wild have been observed in captive situations. The manageability of elephants in terms of their temperament, occurrence of aggression/ stereotypy has been rated.M-R was 4.8 (SE=0.5, N=4) for stereotypic behaviour with a difference of 42% from E-R being observed and M-R for the intensity of such behaviour was 4.3 (SE= 0.9, N = 4) with a deviation of 48% from E-R (Figure 9a and b).

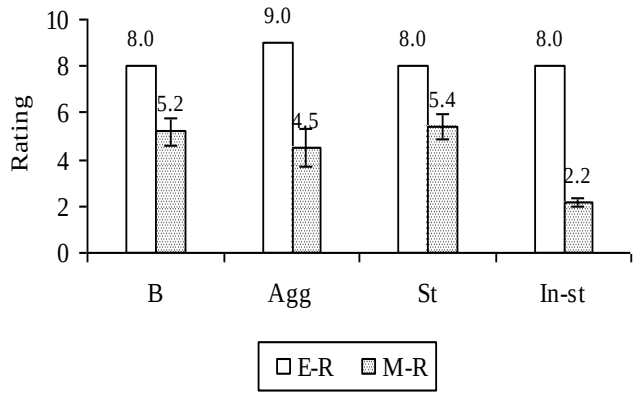
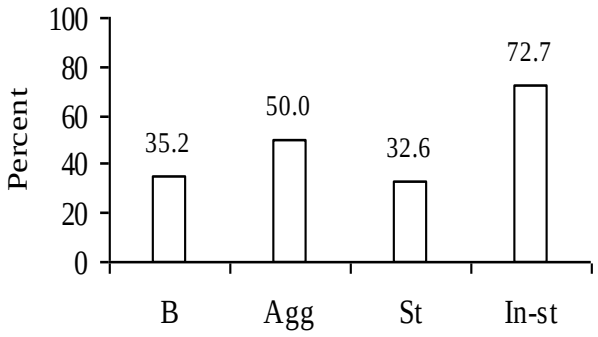


Figure 9a: Comparison of M-R and E-R for 'behaviour' sub-parameters



B: Observed behaviour
Agg: Aggression towards people
St: Stereotypic behaviour
In-st: Intensity of stereotypy

Figure 9b: Percent deviation from E-R for 'behaviour' sub-parameters

Work

- 57% of the elephants were not used for any work (11 females, 15 males)
- Work timings ranged from 7a.m. to 9a.m./ 8a.m.-11a.m. to 4p.m. to 6p.m./ 3p.m. to 5 p.m. with variation according to summer / winter
- Work type involved carrying tourists/ as Kunkie/ carrying firewood/ its fodder/ weed removal

- For safari (tourist ride) elephant carried four people, two trips/ day
- Howdah made of Jute bags filled with grass with iron rods attached to it. Castor oil applied as a lubricant to the metal attachments
- Forest shade available, water from river was accessible and rest provided during work (duration not specified)

Making elephants perform unnatural activities such standing in one place for long durations/ playing with sports equipment such as balls may not be strenuous. They are, however, alien to the natural repertoire and may have negative effects, in the long term, on the animal's body. Nature of work, timings, availability of rest/ food and water was evaluated. M-R was 6.0 (SE= 1.3, N= 7) showing a difference of 25% from E-R (Figure 10a and b).

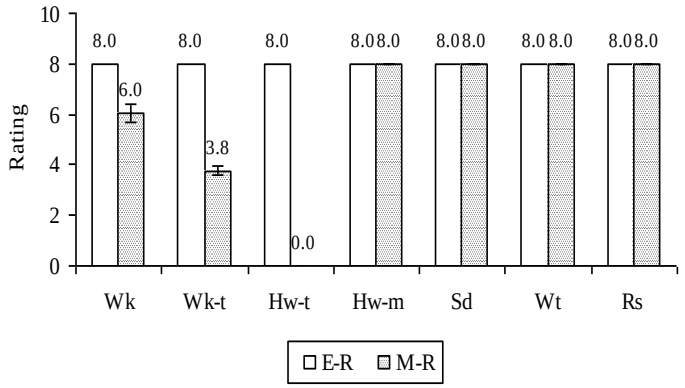
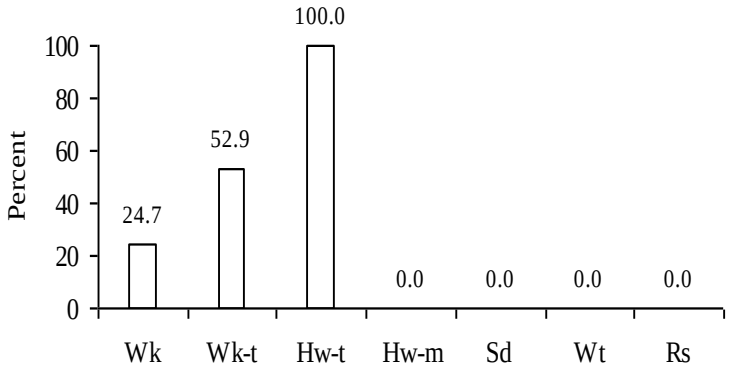


Figure 10a: Comparison of M-R and E-R for 'work' sub-parameters



Wk: Work type
Wk-t: Work timing
Hw-t: Howdah type
Hw-m: Howdah maintenance
Sd: Shade availability
Wt: Water availability
Rs: Rest availability

Figure 10b: Percent deviation from E-R for 'work' sub-parameters

Food

- All elephants, except for the orphaned female infant elephant, were allowed to free range
- Orphaned infant female calf fed 14 times/ day, every 2 hours

- Feeding site for Mudumalai camp was reported to be lacking in hygiene, as it was not cleaned often
- Stall feed included: Ragi (*Eleusine coracana*), Horse gram (*Dolichos biflorus*), Rice (*Oryza sativa*), Coconut (edible part of *Cocos nucifera*), Salt, Jaggery (Sweet extract from sugarcane), mineral mix, sugar cane (*Saccharum* sp.), bamboo (Bambuseae tribe) leaves; mineral mix not provided for Anamalai FC elephants
- Except for one male, none of the elephants were reported to have raided crop fields
- Ration chart used in both camps

Wild elephants feed on a variety of plants (Sukumar, 1991), a range difficult to duplicate while providing only stall feed. Hence, free-ranging opportunity to browse/ graze in habitat with diverse vegetation has been considered. Types of stall feed have also been evaluated. M-R was 6.2 (SE= 1.2, N = 5) with a deviation of 22% from E-R (Figures 11a and b).

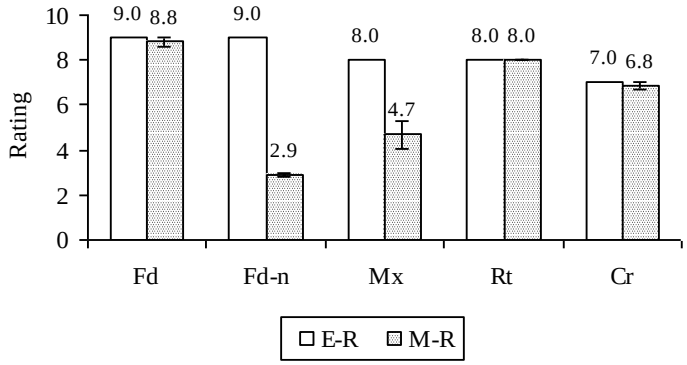
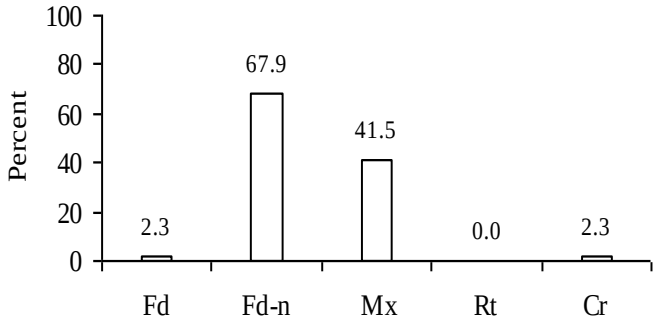


Figure 11a: Comparison of M-R and E-R for 'food' sub-parameters



Fd: Food provisioning type Fd-n: Number of food items
Mx: Mineral mix given Rt: Usage of ration chart
Cr: Crop raiding

Figure 11b: Percent deviation from E-R for 'food' sub-parameters

Chaining

- Seventy seven percentages of elephants (all males) were chained at night with chain weighing 150Kg, of size 16mm and length of 15m. Female elephants were left in the forest with a drag chain; Poole and Taylor (1998) report tethering/

chaining for Mudumalai FC elephants for around 6h. The practice of chaining males at night has since been discontinued

- All elephants, except calves, were tied by both their forelegs

Captive elephants are subjected to the practice of being chained as a form of management. Gruber et al., (2000) have shown an increase in the frequency of stereotypic behaviour exhibited among chained elephants when compared to those in paddocks. M-R was 2.3 (SE= 1.7, N = 3) showing a difference of 71% from E-R (Figures 12a and b).

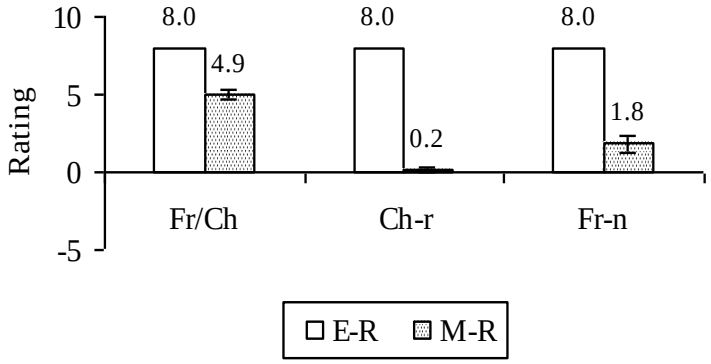
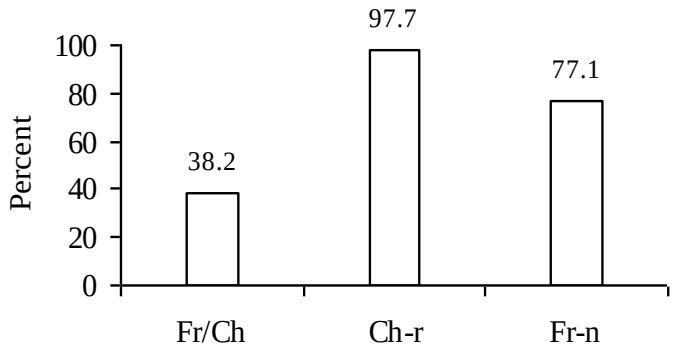


Figure 12a: Comparison of M-R and E-R for 'chain' sub-parameters



Fr/Ch: Free-ranging/ chained Ch-r: Chaining region on elephant's body
Fr-n: Free-ranging opportunity at night

Figure 12b: Percent deviation from E-R for 'chain' sub-parameters

Reproductive status

- Cycling status was not known for six adult females while it was said to occur for the other six
- Exposure to both wild and captive males was reported
- Two adult females had not given birth, despite occurrence of oestrus cycles/ mating
- Abortion of foetus was reported for two adult females, another had produced still-born calves
- Each FC had three mother-offspring pairs; the number of related individuals across both camps was nine
- Except for two adult males, all others were reproductively active

- Seven adult males had not sired offspring
- Three adult males were not in musth
- Among males exhibiting musth, 14 were said to be unpredictable during this period
- Handling of musth elephants: isolation and chaining; two elephants had injured people while in musth
- All elephants with post-musth problems reported infection/ injury of the leg

Normal reproductive functioning was observed among physically healthy elephants (Kurt and Garai, 2007). Absence of normal reproductive behaviour was associated with social isolation/ other stress inducing factors (Clubb and Mason, 2002). The rating was designed to represent the social environment associated with pre and post reproduction: presence of individuals of opposite sex/ observations on mating/ presence of cows during parturition/ occurrence of musth and related factors.

M-R for female reproductive status was 6.3 (SE= 0.7, N= 6) showing a deviation of 15% from E-R.M-R for male reproductive status was 3.5 (SE= 1.4, N= 6) with a difference of 57% being observed from E-R (Figure 13a, b, c and d).

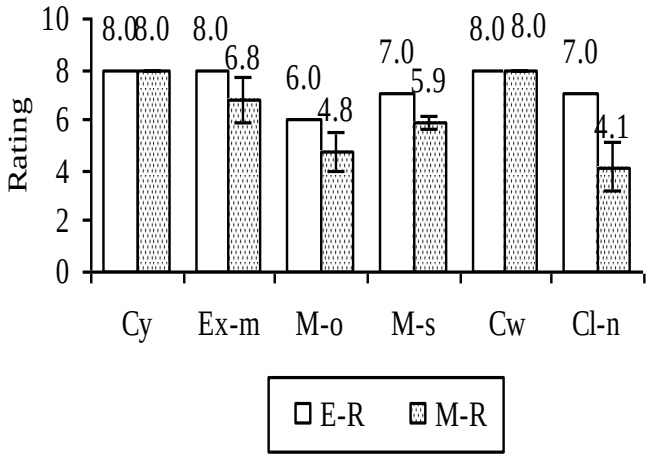


Figure 13a: Comparison of M-R and E-R for 'female reproductive status' sub-parameters

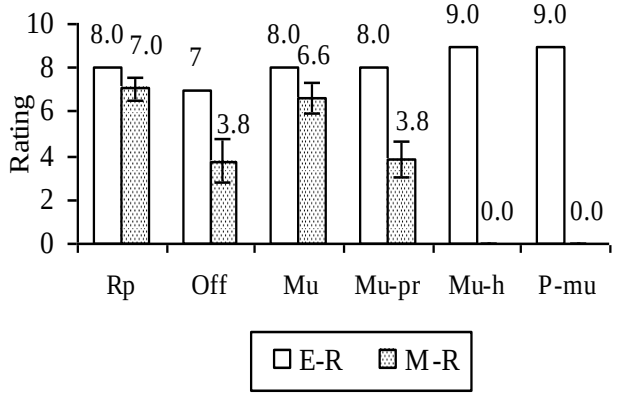


Figure 13b: Comparison of M-R and E-R for 'male reproductive status' sub-parameters

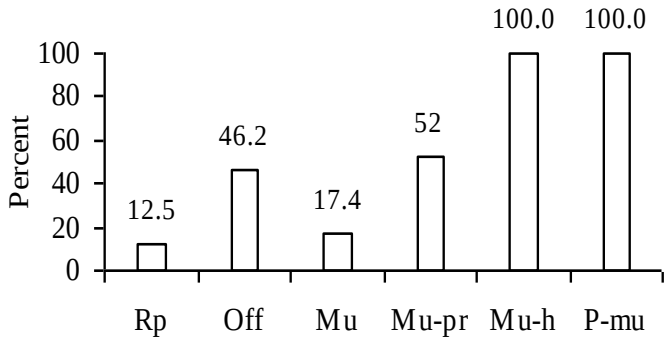
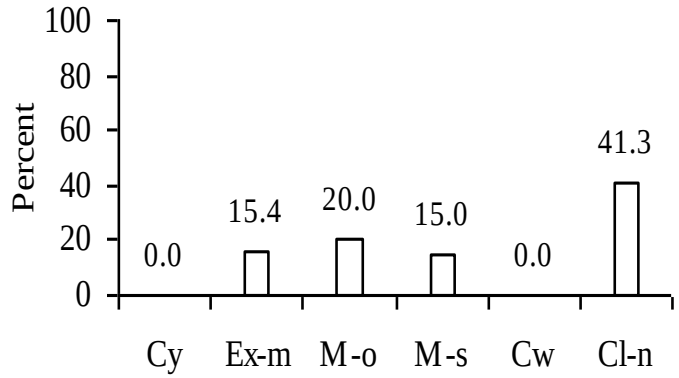


Figure 13c: Percent deviation from E-R for male reproductive status



Cy: Cycling status
Rp: Reproductively active/ not
M-o: Mating observation
Mu: Occurrence of musth
Cw: Presence of cows
Mu-h: Handling of musth
Ex-m: Exposure to males
Off: Offspring sired
M-s: Male source
Mu-pr: Behavioural problems
Cl-n: No. of calves born
P-Mu: Post musth problems

Figure 13d: Percent deviation from E-R for female reproductive status

Health status and veterinary routines

- Two adult females, both > 50y, reported to be blind in one/ both eyes
- Occurrence of diarrhoea observed in some elephants, anemia in one elephant
- All elephants said to be dewormed (both FCs), regularly for Mudumalai FC
- Mudumalai elephants immunized against Anthrax once a year
- Mudumalai FC elephants subjected to oiling of cuticle/ nails twice a day
- Dung and urine analysis done for Mudumalai elephants once a year (urine analysis, dung- twice a year)
- Weight taken once in three months and body measurements once a year for Mudumalai FC elephants

The occurrence of foot problems among captive elephants is a major health issue (Mikota, et al., 1994). Krishnamurthy and Wemmer (1995) noted the occurrence of stomach disorders/ diarrhoea during a 30y period among timber elephants in Top Slip. In addition, diseases such as tuberculosis/ herpes virus infection can be contracted in captivity with fatal consequences. Scheduled practice of veterinary routines can act as a preventive

measure. M-R was 7.0 (SE= 0.3, N=12) indicating a difference of 6% from E-R (Figure 14a and b).

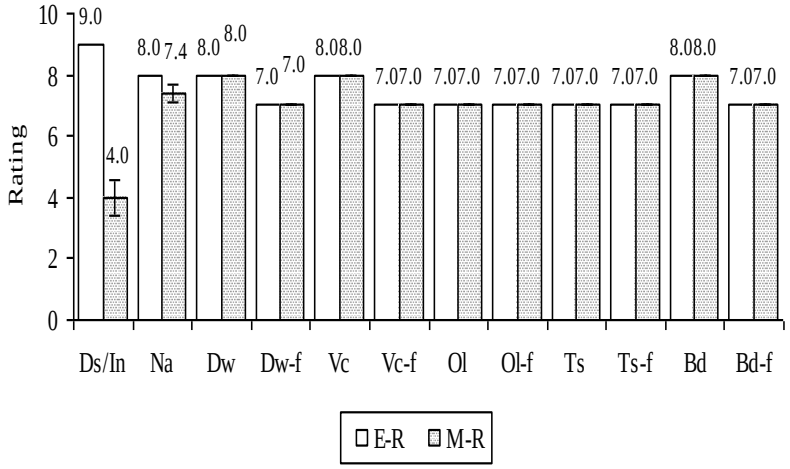
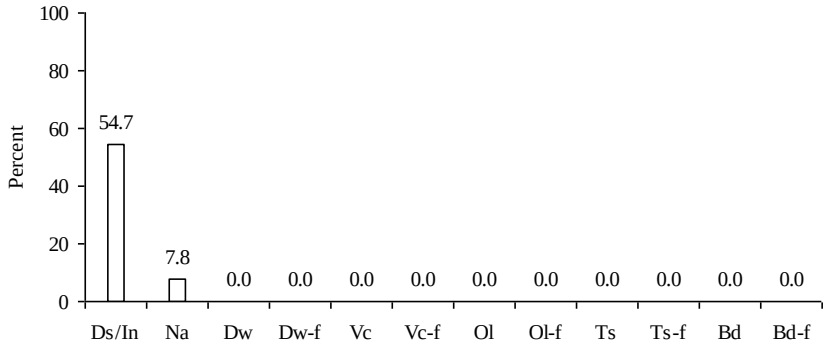


Figure 14a: Comparison of M-R and E-R for 'health and veterinary' routine sub-parameters



Ds/In: Disease/ injury occurrence
Na: Nature of disease/ injury
Dw: Deworming status
Dw-f: Frequency of deworming
Vc: Vaccination status
Vc-f: Frequency of vaccination
Ol: Oiling status
Ol-f: Frequency of oiling
Ts: Dung/ urine/ blood sample tests
Ts-f: Frequency of tests
Bd: Body measurements taken
Bd-f: Frequency of body measurements

Figure 14b: Percent deviation from E-R for 'health and veterinary' routine sub-parameters

Veterinary personnel and infrastructure

- Each FC had access to a veterinary doctor with 5-7 years experience in handling elephants
- The doctor with Mudumalai FC was at the camp itself, hence visits were daily. For Anamalai FC, the doctor was on call, located 100 Km from the camp site
- Mudumalai FC had two veterinary assistants while none were available for Anamalai FC
- Dispensary with basic veterinary equipment was available at Mudumalai FC, not available in Anamalai FC
- Health/ service/ other records were maintained at both camps

- Other facilities such as cooking shed/ vessels/ camp site/ kraal were available with their status varying from moderate to good across both camps

Availability of timely health care with good infrastructure is an important part of a captive elephant structure. M-R was 5.7 (SE= 0.5, N = 15) showing a deviation of 29% from E-R (Figure 15a and b).

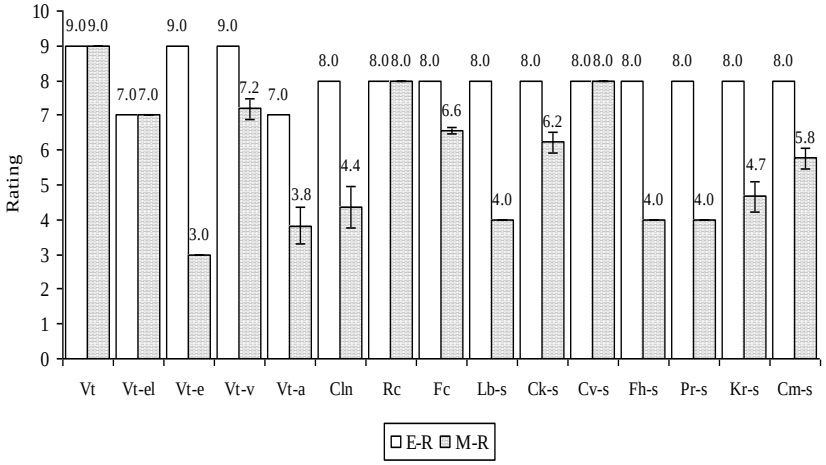
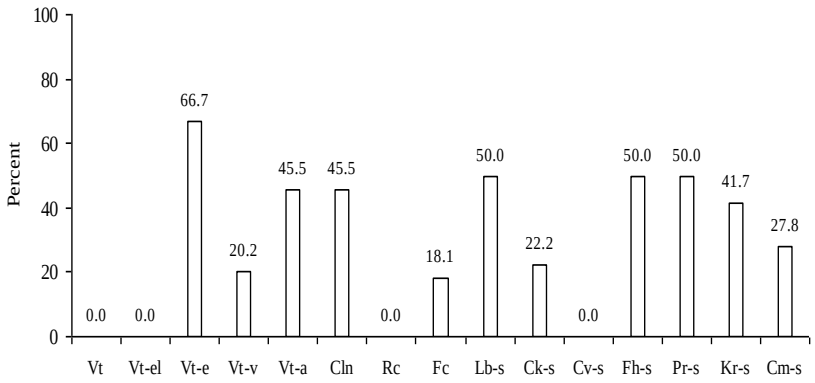


Figure 15a: Comparison of M-R and E-R for 'veterinary personnel and infrastructure' sub-parameters



Vt: Availability of veterinary doctor
Vt-el: Veterinarian's experience with elephants
Vt-e: Veterinarian's years of experience
Vt-v: Visits by doctor
Vt-a: Availability of veterinary assistant
Cln: Availability of clinic facility
Rc: Maintenance of records
Fc: Facilities available
Lb-s: Status of laboratory facility
Ck-s: Status of cooking shed
Cv-s: Status of cooking vessels
Fh-s: Status of food preparation hall
Pr-s: Status of provision shed
Kr-s: Status of kraal
Cm-s: Status of camp site

Figure 15b: Percent deviation from E-R for 'health and veterinary' routine sub-parameters

Professional experience and socio-economic status of handlers

Mahout/ cawadis are an integral part of a captive elephant environment in a system which involves free contact with the animals. Mean age of the handlers was 37.9y (SE= 1.2, N= 71), with age ranging from 18-55y.

Professional experience

- Mean experience in the profession was 13.4y (SE= 1.3, N= 71), ranging from 0.5 to 37y
- Mean experience with a specific camp elephant was 6.3y (SE= 0.9, N= 69), ranging from 0.3 – 35y
- Most handlers had chosen this profession as it was a traditional occupation with a few joining out of interest
- All the handlers had been trained by experience
- Knowledge of commands was said to be good

Professional experience has a direct effect on the way elephants are handled. This parameter has been rated considering the mahout/ cawadi's experience in this profession/ with a specific elephant, knowledge of commands and other relevant features. M-R was 6.9 (SE= 0.1, N= 422) showing a deviation of 24% from E-R (Figure 16a and b).

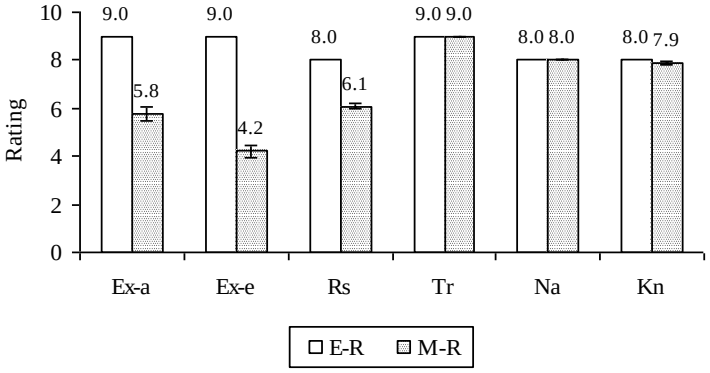
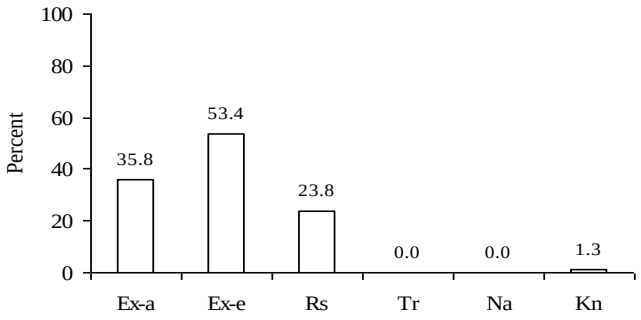


Figure 16a: Comparison of M-R and E-R for 'professional experience' of handlers



Ex-a: Experience (as % of handler age)
Ex-e: Experience (as % of elephant age)
Rs: Reason for choosing this profession
Tr: Training status
Na: Nature of training
Kn: Knowledge of commands

Figure 16b: Percent deviation from E-R for 'professional experience' sub-parameters

Socio-economic status

- All handlers belonged to tribal/ Malasar community
- Most handlers reported handling elephants as a family occupation
- 80% of handlers had studied upto / less than the 5th standard. Only two had studied upto the 10th

- Mean wage was Rs.51,591/- annually, ranging from Rs.14,400/- to Rs. 1,22,424/- one lady mahout worked voluntarily
- Number of children ranged from 0 -8 per family
- Only 36% of the mahouts/ cawadis were insured, with self as the source of funding
- Only four mahouts had been reported for bad conduct (from a total of 71)
- Each handler had worked with a mean of three elephants (ranging from a change of zero to nine elephants) with 30% said to have been attacked by elephants
- 43% handlers were said to consume alcohol with most reported to be drinking after work and only one drinking once a month

Handlers' welfare has to be considered as this aspect is important on its own, also poor welfare and poor handling of animals maybe interlinked. M-R was 4.7 (SE= 0.1, N = 722) indicating a deviation of 32% from E-R (Figure 17a and b).

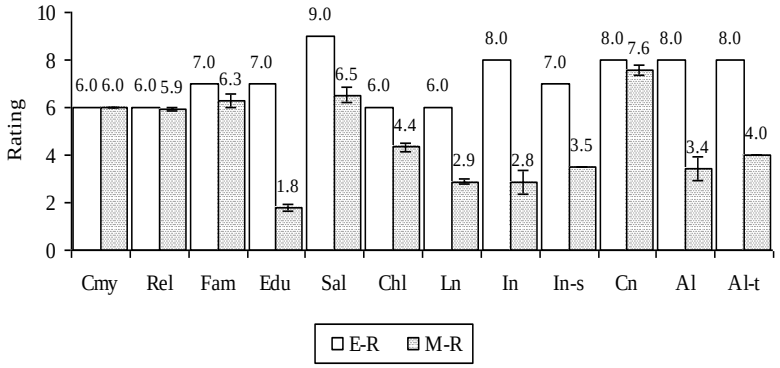
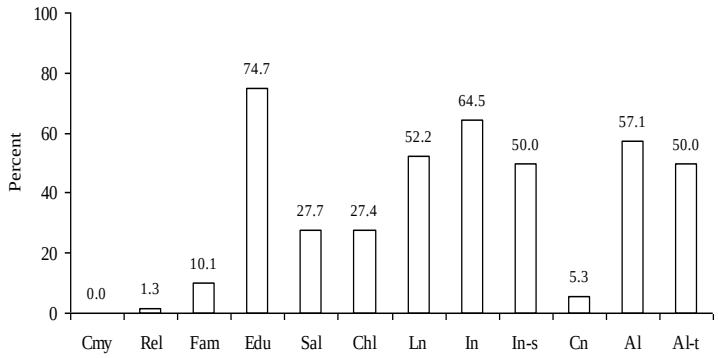


Figure 17a: Comparison of M-R and E-R for 'socio-economic' status of handlers



Cmy: Community
Rel: Having mahout relatives
Fam: Family occupation
Edu: Education level
Sal: Salary drawn
Chl: Number of children
Ln: Languages known
In: Insurance cover availability
In-s: Insurance source
Cn: Bad conduct
Al: Alcohol consumption
Al-t: Timings of consumption

Figure 17b: Percent deviation from E-R for 'socio-economic' status sub-parameters

Distribution of percent deviation from E-R across all parameters

Eighty-five parameters were observed, representing 62% of all the parameters rated by the experts. Overall M-R was 5.9 (SE= 0.05, N= 2855) showing a deviation of 24% from the overall E-R (Figure 18) Deviations less than 40% from E-R accounted for 69%

occurrence among all differences observed. The availability and access to forest areas in the presence of conspecifics, with opportunity to interact and free range, ought to provide basic framework for a suitable captive environment. This was available for both FCs.

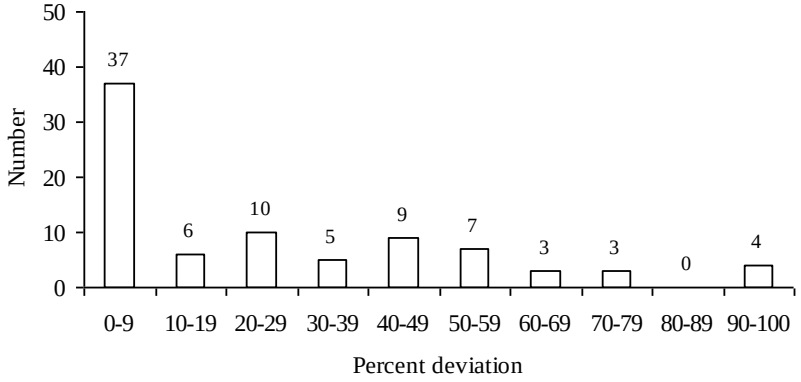


Figure 18: Distribution of percent deviation from E-R across all parameters

Discussion

Acknowledging the physical vigour, mental ability and social complexity of elephants, Kane et al., (2005) states the need to maintain elephants in captivity based on the individual needs as well as on the species' natural history. The knowledge gained from studies on wild elephants can be used as reference to show the deviations experienced by captive elephants and use this as an indicator of welfare status. On one hand, the conditions provided in the FCs are near ideal: forest areas, free ranging opportunity, access to conspecifics and minimum or no work. However, some areas which need greater application are:

- Transfer of calves from their natal herd: most adult female elephants in both camps have given birth to at least one calf. Taylor and Poole (1998) estimated birth of one live young every 7.7y for Mudumalai FC and a mortality of 11% of total births (upto 10y) inclusive of stillbirths. With reproductive success, the number of elephants should have increased along with occurrence of related individuals. But, the number of related individuals within a group is relatively less, implying shifting/ separation of animals.

  Gadgil and Nair (1984) observed two adult females, unrelated, rush to the rescue of a calf on hearing its alarm call— in a FC in the state of Karnataka. The authors opine that separating young animals for training can be traumatic for all the animals concerned.

  Clubb and Mason (2002) cite several authors stating the negative effects of shifting of elephants which may lead to breakage of established bonds/ conflict within the new herd. The elephants: Pari (male, born to a resident camp elephant, Valli) and Aswini (female, adult) were shifted to Vandalur zoo in the state of Tamil Nadu from Anamalai FC.
- Chaining elephants using shackles on both forelegs: Kurt and Garai (2007) mention the deleterious effects of chaining elephants in terms of physical injury to the animals. Incidentally, all the post-musth injuries are related to the leg, possibly a consequence of chaining the elephants

- Mahout change: frequent change of handlers may be a source of stress (Clubb and Mason, 2002). The most frequent reason in the FCs for change in mahout was transfer of mahout either due to retirement or due to change in allocation of elephant
- Transfer across institutions: The transfer of a female elephant, Thayalnayaki (36y) from a temple to Anamalai FC resulted in infection of resident FC elephants with tuberculosis as Thayalnayaki died following TB infection

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Section 3:
Captive Elephants in Zoos

Executive Summary

The Arignar Anna Zoological Park, in Vandalur, Tamil Nadu, covering 600 ha is home to a diverse species of animals. Elephants form part of the captive set of animals housed in the zoo premises. Elephants and their handlers in the Zoological Park were observed and data collected to assess their welfare status. A team of experts, from wildlife biologists to welfare activists, rated different parameters of importance to the welfare of captive elephants. This rating referred to as expert rating (E-R) was then used to assess the welfare status of elephants and mahouts/cawadis with the mean rating (M-R) obtained for given parameter and animal.

The zoo maintained six elephants: three females and three males. The group consisted of two adults, one juvenile male, two infant females and a new-born, rescued calf. None of the elephants was related. Three of the six elephants were rescued while the adult female was captive born (Anamalai Forest camp) and the adult male had been captured following human-elephant conflict. M-R was 3.0 showing a deviation of 50% from E-R.

The purpose of the zoo was said to be related to conservation and rescue/ rehabilitation. M-R was 8.0 with 100% concurrence with E-R. Only one elephant had five different handlers. The infants had no change in their mahouts. M-R was 5.5 showing a difference of 31%.

All the elephants had access to a daytime enclosure of 30 acres of natural scrub forest which was walled and had natural shade available. The night-time shelter consisted of a semi-open shelter (20'X20') with concrete floors. M-R was 5.5 indicating a deviation of 32% from E-R.

All elephants had access to a pond and tank water for drinking / bathing, and they were bathed twice a day, for duration of 2h each, using a brush.

All elephants were allowed to interact with each other, interaction hours were through the day, but the animals were chained at night. Number of individuals ranged from adults to infants, but all were unrelated with two adults being translocated from a Forest camp to the zoo. M-R was 7.8 indicating 100% concurrence with E-R.

All elephants were allowed to browse/ graze in the adjoining 30 acre forest, stall feed provided was: Ragi (*Eleusine coracana*), Horse gram (*Dolichos biflorus*), Banana (*Musa* sp.), coconut (*Cocos nucifera*), Jaggery (sweet derived from sugarcane), cut grass, sugarcane (*Saccharum* sp.).M-R was 5.1 (SE= 1.7, N*= 6) showing a deviation of 39% from E-R

The female elephant was said to have been exposed to captive males, no calves were born, the male elephant was said to exhibit musth; had mated with captive elephant, had not sired any offspring. M-R was 4.9 indicating a difference of 38% from E-R.

Deworming and oiling (application of oil on elephant's body) was done for all elephants; oiling was done with coconut or neem oil and dung/ urine tests were done, body measurements were taken once in three months. M-R was 6 indicating a deviation of 14% from E-R.

Two veterinary doctors were available with experience in treating elephants, both the doctors visited the zoo daily as they were associated with the zoo and a veterinary clinic with good essential facilities was available at the zoo. M-R was 7.1 showing a deviation of 12% from E-R.

Mean age of handler was 30.3yrs, ranging from 26-34 yrs, mean experience in this profession was 7.6yrs, ranging from 6-8yrs, mean experience with a specific zoo elephant was 2yrs. M-R was 6.9 indicating a difference of 19% from E-R.

Family occupation was handling elephants for handlers and one was a daily wage employee, mean salary drawn was Rs. 40,560/- annually, none of the handlers had insurance cover and none of the handlers had been reported for bad conduct; did not consume alcohol. M-R was 4.9 (SE= 0.9, N= 9) with a deviation of 32% from E-R

The welfare of the elephants in this zoo was evaluated by considering the deviation from the wild for the parameters observed. Overall M-R was 5.5 indicating a deviation of 31% from E-R. The provision of vast space of natural scrub forest in this zoo is a commendable feature, considering the limited space available to most captive elephants. The occurrence of a group of elephants of diverse age and sex is also noteworthy, along with availability of veterinary doctors and good facilities. However, elephants undergo captivity situation as a complex interaction of various factors.

Introduction

The Arignar Anna Zoological Park in Vandalur, Tamil Nadu is home to a diverse species of animals. The zoo covers an area of around 600 ha of Vandalur Reserve forest (http://www.aazoopark.gov.in). Elephants form part of the captive set of animals housed in the zoo premises. The captive environment provided to elephants determines the state of well-being of the animals keeping the species-typical needs of the animals as a reference.

Objectives

Elephants and their handlers (mahouts/ cawadis) in the Arignar Anna Zoological Park (Vandalur zoo) were observed and data collected to:

- Assess their welfare status through a set of physical/ social/ physiological features along with availability of veterinary care and facilities
- Assess the professional experience and socio-economic status of elephant handlers.

Method

Notwithstanding their long association with people, elephants have not been domesticated (Lair, 1997; Kurt and Garai, 2007); the species-typical needs of the animals ought to determine their captive state as a divergence from features found in the wild are likely to affect their well-being in captivity. This divergence has been used to assess the welfare of elephants: the greater the difference, the poorer the welfare. Elephants in Vandalur zoo were observed along with interviews of relevant personnel, and data collected on different features: physical attributes (space/ food/ water), social, physiological and health; management in the form of veterinary facilities. Data pertaining to professional experience and socio-economic status of handlers was collected through interviews with relevant personnel. The deviation from conditions in the wild has been rated using a scale developed by elephant experts.

The 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 specialist, wildlife veterinary experts, mangers from protected areas, those have both wild and captive elephants and other wildlife, personals from welfare organisations and elephant handlers) were invited to assess the welfare based on welfare parameters and their significance through a 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 the importance of a particular parameter to an elephant, developed 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) was arrived for ‘source of water’ 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.

- Elephants were visited on the ground; data for each parameter was collected by direct observations or with the interviews of people associated the animal. Mean Rating (M-R) was calculated for a given parameter, along with its sub-parameter. 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 condition have been grouped to form a parameter. 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 regime here represent the average across related parameters observed for the regime. 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.
- 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 expert rating (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.

Result

The zoo maintained six elephants: three females and three males. The group consisted of two adults (male and female), one juvenile male, two infant females and a new-born calf. Age classification based on Kurt and Garai (2007). None of the elephants were related.

Source of elephant

Shifting of elephants from one location to another can be a source of stress (Clubb and Mason, 2002), leading to breakage of established bonds between resident animals (Kurt and Garai, 2007). Three of the six elephants were rescued while the adult female was captive born (Anamalai Forest camp) and the adult male had been captured following human-elephant conflict. M-R was 3.0 (SE= 0.53, N = 5) showing a deviation of 50% from E-R.

Purpose of keeping

Maintaining elephants in centers for rehabilitation/ rescue where commercial gain is not of paramount importance may lead to the elephants not being overworked/ badly managed. The purpose of the zoo was said to be related to conservation and rescue/ rehabilitation. M-R was 8.0 (SE= 0.0, N =5) showing 100% concurrence with E-R.

Change of mahouts

Handlers associated with captive elephants may develop a bond with their animals. When such handlers are changed due to various reasons, it could result in stress for the animal. Only one elephant (male, juvenile) had five different handlers. The infants had no change in their mahouts. M-R was 5.5 (SE= 2.2, N=3) showing a difference of 31%.

Shelter

- All the elephants had access to a daytime enclosure of 30 acres of natural scrub forest which was walled.
- Natural shade was available in daytime enclosure.
- Night-time shelter consisted of semi-open shelter (20'X20') with concrete floors.
- Shelter was cleaned daily for dung/ excess food waste.

Wild elephants are known to be active, foraging across varied habitat, with studies reporting home range sizes of 100- 300 m^2 (Sukumar, 1991). Captive conditions may be limited in their ability to duplicate such conditions. M-R was 5.5 (SE= 1.4, N= 7) indicating a deviation of 32% from E-R (Figure 1a and b).

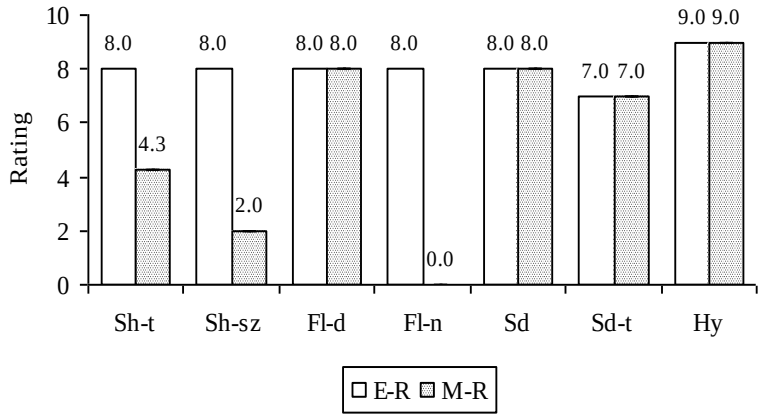
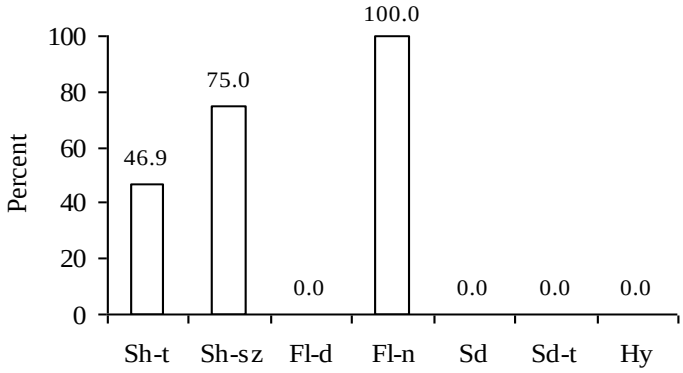


Figure 1a: Comparison of rating for 'shelter' sub-parameters



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 1b: Percent deviation from E-R for 'shelter' sub-parameters

Water and related features

- All elephants had access to pond and tank water for drinking / bathing.
- They were bathed twice a day, for a duration of 2h each using a brush.
- Water quality tests were not done.

Elephants are reported to drink water at least once a day, subject to water availability (Sukumar, 1991). Bathing (the act of throwing water on their body or immersing themselves in water) followed by related activities such as mud-bath/ wallow are said to be important in maintaining good skin care (Kurt and Garai, 2007). In captive situations, bathing the animal is usually done by mahouts/ cawadis. Hence, the material used, if any, has also been rated (Figure 2a and b).

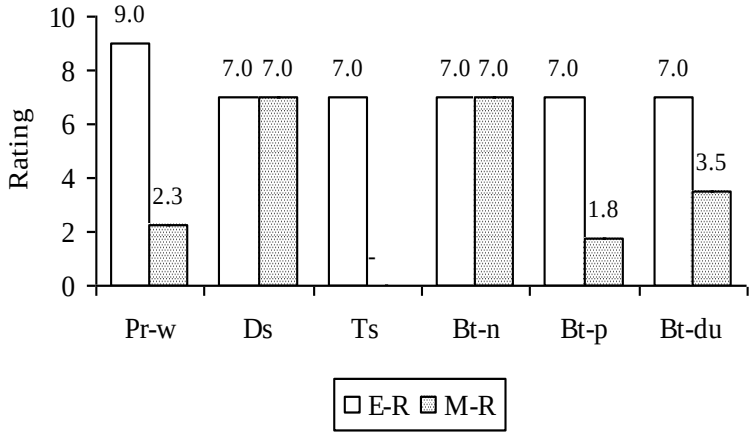
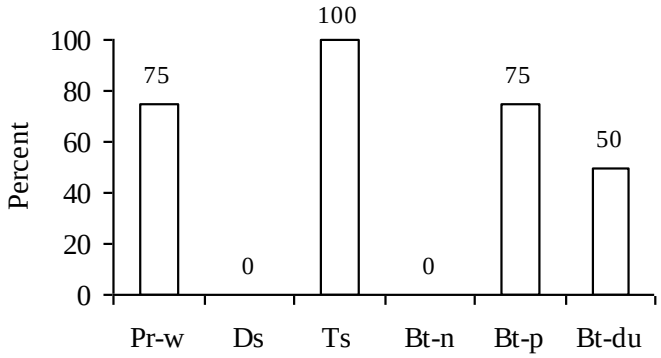


Figure 2a: Comparison of rating for 'water' sub-parameters



Pr-w: Availability of perennial source of running water
Ds: Distance to water source
Ts: Water quality tests
Bt-n: Bathed number of times
Bt-p: Bathing place
Bt-m: Bathing materials

Figure 2b: Percent deviation from E-R for 'water' sub-parameters

Sleep

The elephants were chained in their night-time shelter. The animals were said to sleep for a duration of 4 hours. M-R was 0.0 for the sub-parameter— sleeping place, showing 100% deviation from E-R.

Walk

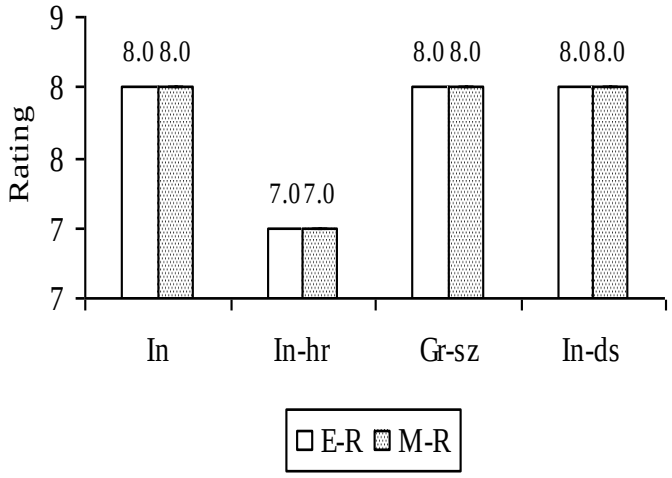
- The elephants are allowed to free range in the adjoining forest from 6:30 a.m to 8:30 a.m

Elephants in the wild are on the move for most parts of a day, foraging/ searching for companions (Poole and Granli, in press). Restricted captive environments may not be able to provide opportunities to their elephants to move for suitable duration/ on appropriate surface. M-R was 9.0 (N*=2) showing zero deviation from E-R for the sub-parameters observed.

Social interaction

- All elephants were allowed to interact with each other
- Interaction was through the day, but the animals were chained at night
- The elephants were said to be within reach of each other
- Number of individuals ranged from adults to infants, but all were unrelated with two adults being translocated from a Forest camp to the zoo

The need to interact with others of the same species is paramount for a social species like the elephant. Bonds lasting across generations have been reported (Sukumar, 2003) with males said to disperse gradually from their natal herd (Poole and Moss, 2008), or form bachelor groups or associate with family groups while searching for mates (Kurt and Garai, 2007). M-R was 7.8 (SE= 0.3, N = 4) indicating 100% concurrence with E-R (Figure 3).



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

Figure 3: Comparison of rating for 'social interaction' sub-parameters

Chaining

- All the elephants were chained during the night
- Three elephants (all below 10y) chained in one leg only
- Chain weight was 150Kgs, Size—16mm, and length 10m.
- Elephants were not chained when on display
- None of the elephants were allowed to free range at night

Constant chaining of the same region of the body results in formation of pus filled wounds (Kurt and Garai, 2007); chaining has also been associated with increased frequency of stereotypy (Gruber, et al., 2000). M-R was 1.7 (SE= 1.5, N= 3) with a deviation of 79% from E-R (Figure 4a and b).

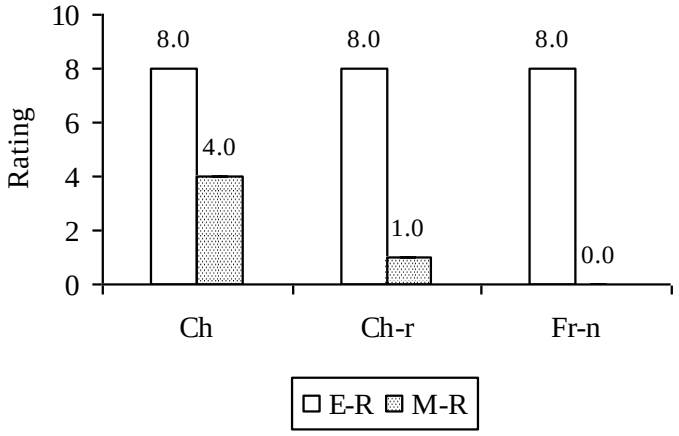
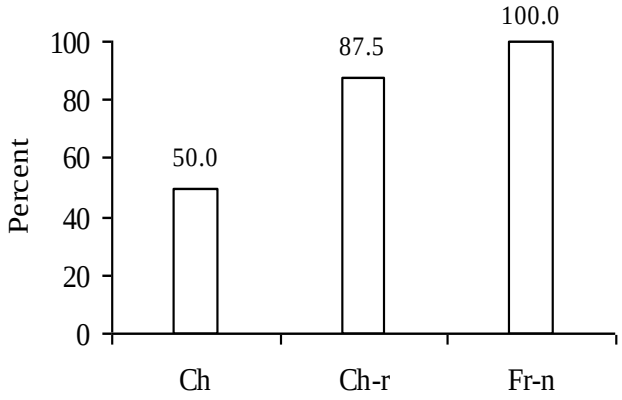


Figure 4a: Comparison of rating for 'chaining' sub-parameters



Ch: Chaining status Ch-r: Region of chaining Fr-n: Free-ranging at night

Figure 4b: Percent deviation from E-R for 'chaining' sub-parameters

Observed behaviour

- Two elephants were described as "frightened" while the others were "quiet" with a 2 yrs old being described as "playful."
- Three elephants were said to be aggressive towards people with the adult male having injured people; one infant was aggressive towards other elephants; the adult female not exhibiting any aggression.
- One female infant and the adult female were said to exhibit stereotypic head bobbing of low to medium intensity respectively.

Ease of managing the elephant along with occurrence of aggression/ stereotypy was rated. M-R was 4.7 (SE= 1.2, N= 4) showing a deviation of 41% from E-R (Figure 5a and b).

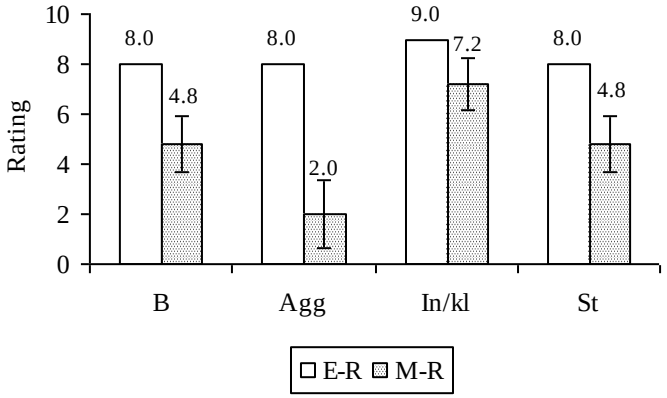
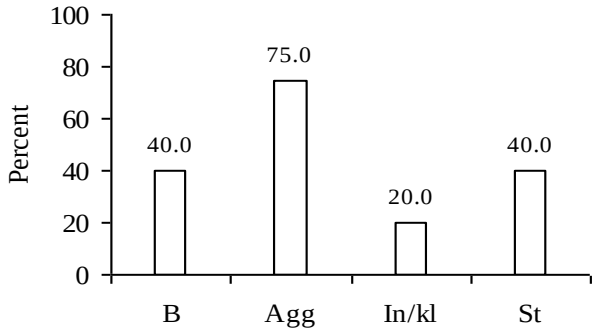


Figure 5a: Comparison of rating for 'behaviour' sub-parameters



B: Observed behaviour Agg: Aggression towards people
In/kl: Incidents of injury/ killing St: Stereotypic behaviour

Figure 5b: Percent deviation from E-R for 'behaviour' sub-parameters

Food

- All elephants were allowed to browse/ graze in the adjoining 30 acre forest from 6:30a.m to 8:30a.m.
- Stall feed provided was: Ragi (*Eleusine coracana*), Horse gram (*Dolichos biflorus*), Banana (*Musa* sp.), coconut (*Cocos nucifera*), Jaggery (raw concentrate of sugar cane juice), cut grass, sugarcane (*Saccharum* sp.).
- Mineral mix was not given; Ration chart was maintained, details included: food type, quantity and frequency
- Feeding place hygiene was good

Wild elephants spend 12-18 h in foraging/ feeding (Sukumar, 1991) feeding on variety of plants (McKay, 1973). This variety will be difficult to duplicate in captivity, given the constraints of space while free ranging or through stall feed. M-R was 5.1 (SE= 1.7, N*= 6) showing a deviation of 39% from E-R (Figure 6a and b).

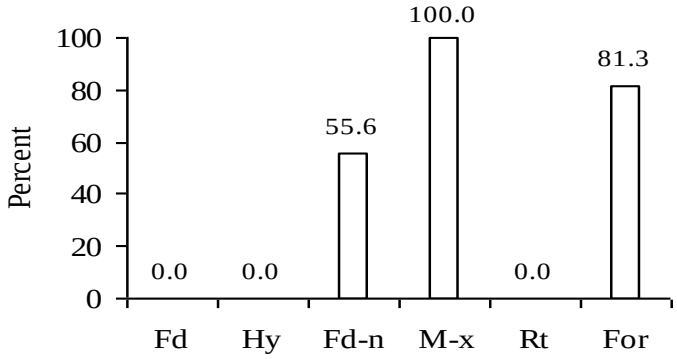
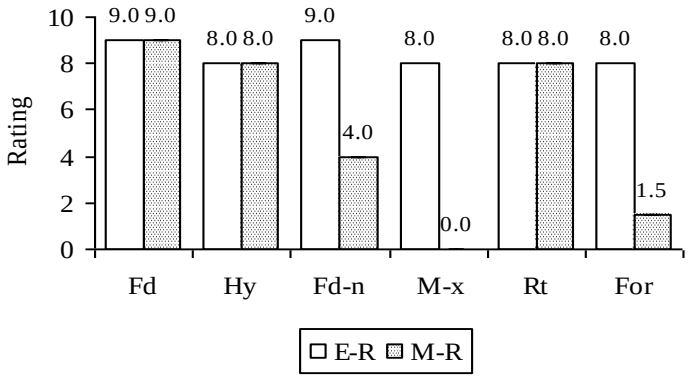


Figure 6a: Comparison of rating for 'food' sub-parameters



Fd: Food provisioning type
Hy: Hygiene maintenance
Fd-n: Number of food items
M-x: Provision of mineral mix
Rt: Usage of ration chart
For: Foraging duration

Figure 6b: Percent deviation from E-R for 'food' sub-parameters

Work

None of the elephants were reported to be made to work. M-R was 8.0 (SE= 0.0., N= 5) showing 100% concurrence with E-R.

Reproductive status

- The female elephant was said to have been exposed to captive males, no calves were born
- The male elephant was said to exhibit musth; had mated with captive elephant, had not sired any offspring

Availability of individuals of opposite sex, normal reproductive functioning, opportunity to mate, birth of offspring, etc., are some features rated for this parameter. The availability of only two adult individuals entails restriction of reproductive features to these two elephants only. M-R was 4.9 (SE= 1.8, N= 6) indicating a difference of 38% from E-R (Figure 7a and b).

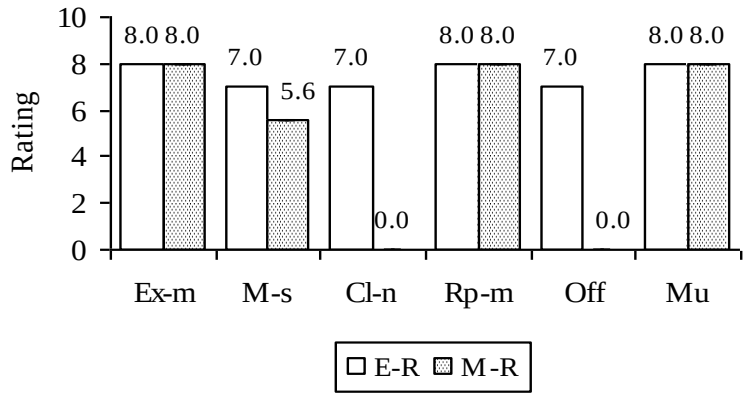
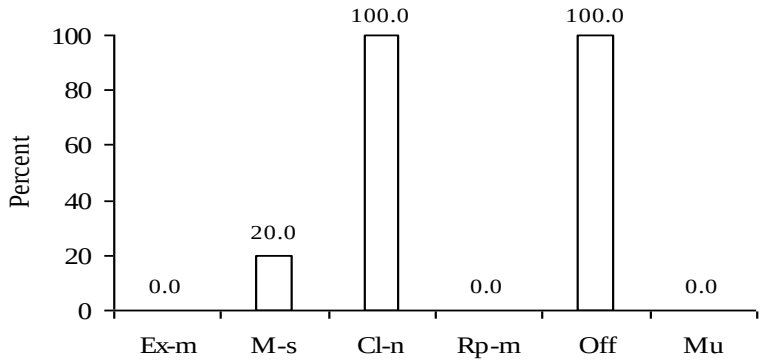


Figure 7a: Comparison of rating for 'reproductive status' sub-parameters
(Based on observations of two individuals only)



Ex-m: Exposure to males M-s: Male source Cl-n: Number of calves born
Rp-m: Male reproductive status Off: Offspring sired Mu: Musth occurrence

Figure 7b: Percent deviation from E-R for 'reproductive status' sub-parameters
(Based on observations of two individuals only)

Health and veterinary routine

- Both adult elephants had leg wounds.
- Deworming and application of oil was done for all elephants; oiling with coconut or neem oil.
- Dung/urine tests were done.
- Body measurements were taken once in three months.

Captive conditions may predispose the elephant to diseases prevalent in the surrounding population. Tuberculosis is a disease transmitted across species, capable of infecting elephants from their exposure to people/ cattle. Another common ailment is the occurrence of foot problems (Mikota, et al., 1994). Thus, the practice of following a set of prescribed veterinary routines such as physical examination, vaccination/ tests of blood/ dung/ urine samples, body (weight) measurements, etc., gains importance. M-R was 6.0 (SE= 0.9, N= 10) indicating a deviation of 14% from E-R (Figure 8a and b).

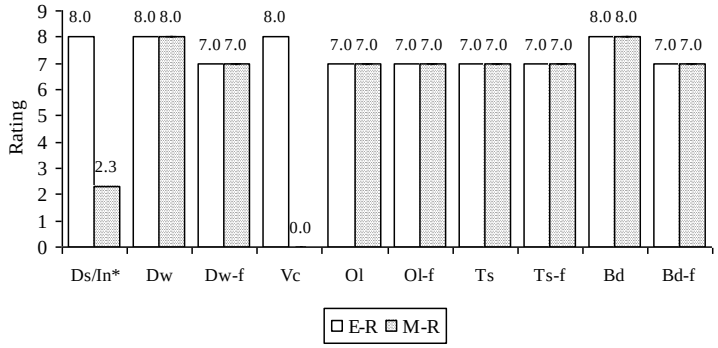
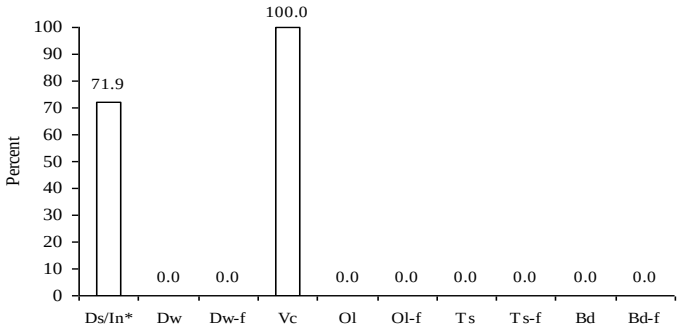


Figure 8a: Comparison of rating for 'health and veterinary' routine sub-parameters



Ds/In: Occurrence of disease/ injury*
Dw: Deworming status
Dw-f: frequency of deworming
Vc: Vaccination status
Ol: Oiling status
Ol-f: frequency of oiling
Ts: blood/ dung / urine sample tests
Ts-f: frequency of tests
Bd: Body measurements taken
Bd-f: Frequency of body measurements
(*based on two elephants only)

Figure 8b: Percent deviation from E-R for 'health and veterinary' routine sub-parameters

Veterinary personnel and infrastructure

- Two veterinary doctors were available, with experience in treating elephants
- Both the doctors visited the zoo daily as they were associated with the zoo
- A veterinary clinic with good essential facilities was available at the zoo
- Record keeping included individual history, treatment records, etc.
- Other facilities available were: staff quarters, cooking shed & vessels, food preparation hall, provision shed, camp site and other materials such as elephant chain, rope, etc.

Availability of veterinary personnel and good infrastructure are important in maintaining health and better management of the institution. M-R was 7.1 (SE= 0.7, N = 8) showing a deviation of 12% from E-R (Figure 9a and b).

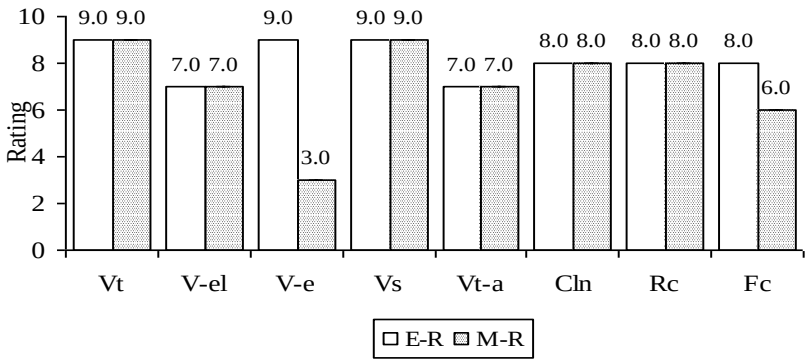
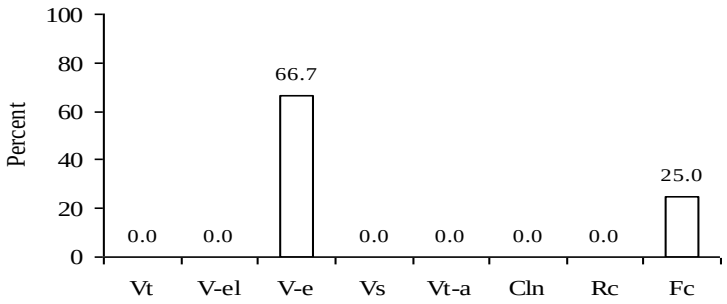


Figure 9a: Comparison of rating for 'veterinary personnel and infrastructure' sub-parameters



Vt: Availability of veterinary doctor
V-El: Experience with elephants
V-e Years of experience
VS: Doctors visits
Vt-a: Availability of veterinary assistant
Cln: Clinic facility
Rc: Record keeping
Fc: Other facilities

Figure 9b: Percent deviation from E-R for 'veterinary personnel and infrastructure' sub-parameters

Professional experience and socio-economic status of mahouts/ cawadis

Handlers are integral to captive elephant environments which employ free contact with their animals. The professional experience of handlers has a direct bearing on elephant welfare. Socio-economic status is important in terms of handler welfare and indirectly may have an influence on the way the elephants are handled. Mean age of handler was 30.3 yrs, ranging from 26-34 yrs (N=3).

Professional experience

- Mean experience in this profession was 7.6 yrs, ranging from 6-8 yrs
- Mean experience with a specific zoo elephant was 2 yrs (ranging from 1.5 – 2 yrs)
- Two handlers had joined out of interest while one person was chosen as he had already had experience in handling elephants
- The handlers were trained by their experience of being with elephants
- Knowledge of commands was said to be good
- All handlers used a stick to manage their elephants

Experience in the profession coupled with an interest in this job is considered ideal for the handler as well as his/ her elephant. In addition, handlers' nature of training and

knowledge of commands has have been considered. M-R was 6.9 (SE= 0.6, N= 5) indicating a difference of 19% from E-R (Figure 10a and b).

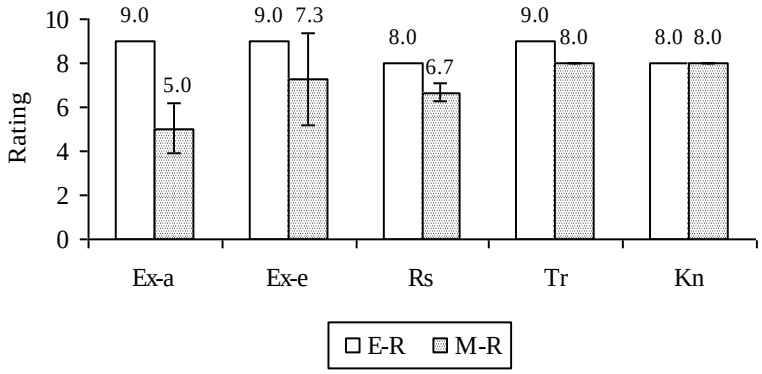
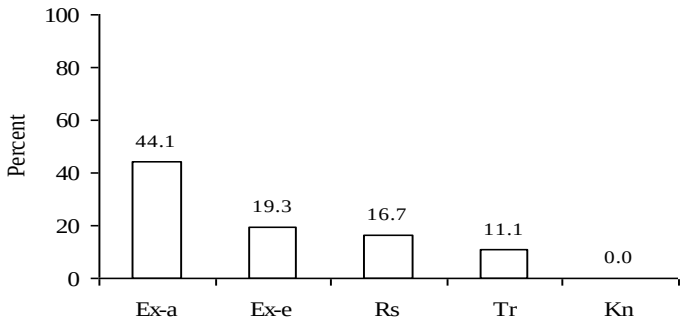


Figure 10a: Comparison of rating for 'handlers' professional experience' sub-parameters



Ex-a: Experience (as % of his age) Ex-e: Experience (as % of elephant age)
Rs: Reason for choosing this profession Tr: Training status
Kn: Knowledge of commands

Figure 10b: Per cent deviation from E-R for 'handlers' professional experience' sub-parameters

Socio-economic status

- All handlers belonged to the Malasar community (known for their traditional knowledge of elephants.
- Family occupation was handling elephants for handlers and one was a daily wage employee.
- Education varied from 1st standard to 9th .
- Mean salary drawn was Rs. 40,560/- annually.
- Number of children varied from 2-3.
- Languages known ranged from one to three.
- None of the handlers had insurance cover.
- None of the handlers had been reported for bad conduct; a few did consume alcohol.

Handlers' family background, education status, income generated from this employment, insurance availability, etc., were considered. M-R was 4.9 (SE= 0.9, N= 9) with a deviation of 32% from E-R (Figure 11a and b).

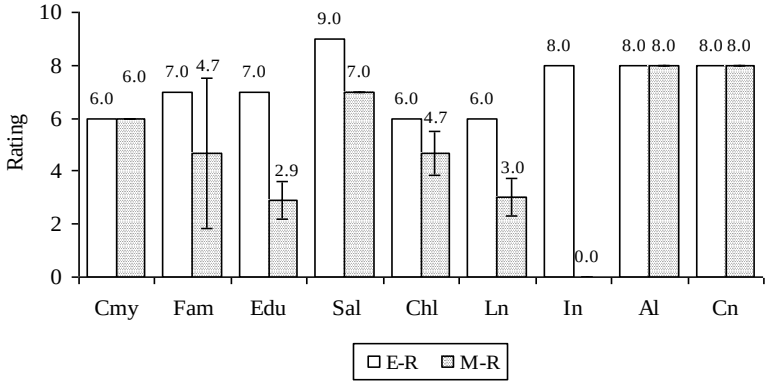
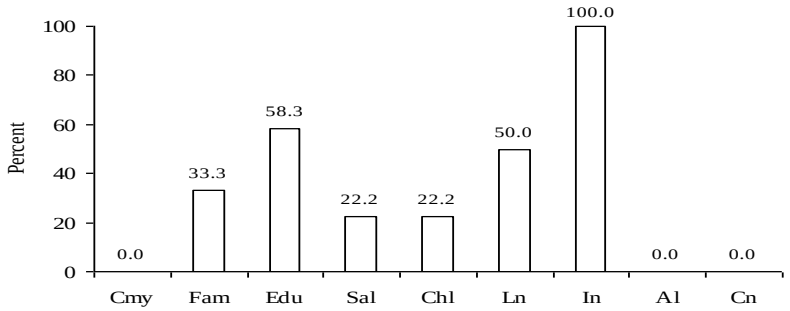


Figure 11a: Comparison of rating for 'handlers' socio-economic status' sub-parameters



Cmy: Community Fam: Family occupation Edu: Education status
Sal: Salary drawn Chl: Number of children Ln: Languages known
In: Insurance availability Al: Alcohol consumption Cn: Reported bad conduct

Figure 11b: Percent deviation from E-R for 'handlers' socio-economic status' sub-parameters

Overall mean ratings for captive elephants in zoo of Tamil Nadu

The welfare of the elephants in this zoo was evaluated by considering the deviation from the wild for the parameters observed. Overall M-R (considering each rating across all elephants and sub-parameters) was 5.5 (SE= 0.4, N**= 55) indicating a deviation of 31% from E-R (Figure 12).

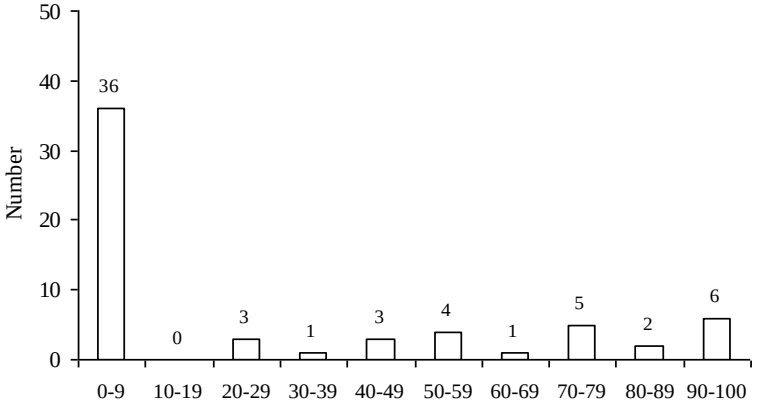


Figure 12: Percent deviation of overall M-R from E-R

Discussion

One reason, among many, given for maintaining wild animals in zoos is to popularize the concept of wildlife and conservation among lay people. This reason requires not only display of animals to the public but also conservation and display of its natural behavioural repertoire in near natural settings, ensuring minimum deviation from the wild. Veasey (2006) notes the importance of keeping captive elephants by referring to their biological and habitat needs.

The provision of vast space (30 acres) of natural scrub forest in this zoo is a commendable feature, considering the limited space available to most captive elephants. The occurrence of a group of elephants of diverse age and sex is also noteworthy, along with availability of veterinary doctors and good facilities. However, elephants undergo captivity as a complex interaction of various factors. The presence of a large space may be offset by an inability to use this space.

Features which were not conducive to elephants:

- The practice of keeping the elephants for display within their enclosure: even though space was available, the elephants were allowed to free range for only two hours a day. Poole and Granli (in press) state the need for elephants to move across varied habitat, anatomical structure of elephants making them unsuitable for standing in one place for long. At night the elephants were chained and made to sleep on concrete floors. Chaining restricts the ability of the elephants to express appropriate behaviour in the presence of conspecifics. Benz (2005) cites several authors reporting on the association between hard floors and occurrence of foot problems in elephants.
- The practice of restricted access to forage in the surrounding forest space meant availability of time for the elephants with "nothing-to-do," wild elephants spend most parts of a day foraging. The cognitive capacities of elephants have been documented (authors cited by Poole and Moss, 2008); absence of psychological stimulation for most parts of a day may be undesirable in terms of welfare of the elephants.
- Non-availability of water-bodies with running water: stagnant water may act as a source of infection. Also, suitable sized water-bodies for the elephants to immerse themselves were not available as the elephants were reported to be bathed in enclosures measuring 20'X20'. Kurt and Garai (2007) report of the importance of provision of suitable water-bodies for captive elephants, with the animals indulging in social interaction/ play while making use of temporary rain-water puddles in a captive elephant institution in Sri Lanka.
- The shifting of two adult elephants from Anamalai FC to this zoo may not have been conductive for the elephants considering that the male was captive born, with the mother also in the same camp. Breakage of established familial bonds or relationships has been associated with stress among elephants (Clubb and Mason, 2002). While the zoo is said to have had success in rearing orphaned young elephants (The Hindu, March, 2002) the policy of the translocation of elephants from the zoo to different institutions needs review, keeping in mind the group structure of the elephants and providing for the elephants to choose their social partners.
- Both adult elephants were reported to be made to work by providing tourist rides: 9:30a.m. -11:30a.m. and 4:00p.m. – 5:30p.m., at the time of writing this report. The use of elephants for work involves two aspects:

a. work conditions: time of work should ideally involve early morning or late evening and on natural terrain; provision of food/ rest/ water while working; maintenance of howdah
b. elephant behaviour: work takes away the time an animal gets to spend with its conspecifics, providing no freedom to express its natural repertoire of behaviour

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Section 4:
Captive Elephants of Temples

Executive Summary

Tamil Nadu has a long history of keeping elephants in captivity; however, there have been few attempts at measuring or documenting the captive condition of these animals. This study aims to measure the status of temple-owned elephants, with a view to assess the way in which these animals are taken care of.

A total of 54 parameters were observed and recorded on their living conditions and each parameter was rated on a scale of 0 to 10, with 10 representing the most ideal condition for the animal. Twenty-five temple-owned elephants were selected across different locations in Tamil Nadu. Each temple corresponded to one location, thus total locations were 25. Of these, 24 were females ranging in age from 6 to 57 yrs with a single 18 yr old male elephant resulting in a sex ratio of 0.04:1 (Male: Female). The average age of the elephants was 30.58.

Fifty seven percent of the enclosures were made of concrete or reinforced concrete material while 30 % had iron sheet or stone as part of the enclosure. Thatched leaves were recorded in three temples: The overall mean rating for shelter was 3.81 with values ranging from 0.00 to 5.83 for each location. Mean rating for floor type was 0.42 and 95 % of the shelters had hard floors with only one shelter providing an earthen floor.

Ninety percent of the temples provided water through taps. Ponds, tanks and rivers were also used for providing drinking water or for bathing the animal. The distance to water source depended on the number of sources used: tap water at zero distance to the animal while ponds /rivers were situated several kilometers away. The mean distance to a water source not inside the enclosure was 2.75 Km. Overall mean rating for water related variables were 3.64.

Tamil, Malayalam, Urdu and Hindi were the languages used to give commands to the elephants. The mean number of commands was 23. Though all the elephants had temple related work to perform, the number of commands ranged from 7 to 50.

The mean rating for providing training was 1. The mean score for number of commands to be learnt was 2.22 with 77.77% of the elephants getting a score of 0. The rating indicates that the elephants were forced to learn higher number of commands for a longer period of time.

Of the animals observed across different locations for social interaction, only one was allowed to interact, and the mean rating for prevalence of social interaction was only 0.57.

For elephants observed, work type was temple oriented: standing in front of the temple, going around it, taking part in temple festivities. Mean work duration was 6.54 and the mean rating for work type was 0

Ninety-two percent of the elephants were stall fed while two percent were allowed to free range and provided stall feed. Food types were varied: rice, sorghum, ragi, pongal (rice and lentil porridge) , pulses, coconut leaves, green fodder, mineral mixture, salt, ghee (clarified butter) and sugar Mean rating for food and related parameter was 5.42 with 91.7 % of the elephants getting a score of 5.

All the elephants observed had chains on their legs with 46 % of the animals having two chains— front legs shackled or front and hind leg. The overall mean rating for chain related parameters was 0.47

Forty-two percent of the observed elephants were not cycling while the status was not known in 25 % of the animals. 25 % of the animals were reported to be cycling. However, none of these animals were exposed to males. The lone male maintained among the temples observed was said to exhibit musth.

All the temples had access to a veterinary doctor with 16 locations having access to a doctor on call with mean distance to the doctor being 3.94 km. Ten locations maintained medical records along with insurance particulars in some cases. Vaccination was provided against anthrax for twenty-two elephants. Overall mean rating for veterinary care was 9.84.

The mean value for veterinary facility was 6.84, the individual mean rating ranged from 4.6 to 9.5, and 50% of the doctors did not have any elephant experience.

Mean age for mahout was 41.5 yrs and for cawadi, mean age was 36.9 yrs. Mean wages for mahout was Rs. 17,218/ year. The overall mean rating for mahout experience was 8.39 ranging from 2.5 to 10.

The overall mean rating for elephants across all the parameters observed was 4.8. The overall mean for handlers was 6.2 and the results are statistically significant indicating the welfare status of Mahout/ Cawadi was relatively better than that of the elephants.

Introduction

Tamil Nadu has a long history of keeping elephants in captivity. The practices followed in providing care for an animal with unique needs for space/ behavioural biology/ health need scrutiny, especially in the light of constraints of resources/ disinterest encountered while maintaining captive elephants. However, there have been few attempts at measuring or documenting the captive condition of these animals. This study aims to measure the status of temple-owned elephants, with a view to assess the way in which these animals are taken care of. Temples in different districts of Tamil Nadu were selected for collection of data on their condition in captivity.

Objective

To assess the welfare status of captive temple elephants in Tamil Nadu by quantifying the living conditions as well as the behavioral and the physiological status of the captive animal through a specific rating scale.

Method

Twenty-five temple-owned elephants were selected across different locations in Tamil Nadu. A total of 54 parameters were observed and recorded ranging from living conditions such as shelter type, size, water availability, nature of floor, shade availability, to behavioral and physiological aspects such as the nature of observed personality of the elephant, provision for social interaction with other elephants, occurrence of stereotypy, reproductive status of the elephant, etc. Each parameter was rated on a scale of 0 to 10, with 10 representing the most ideal condition for the animal. Parameters of the "yes-no" type get only two kinds of scores: 0 or 10.

For example: provision of hard surfaces such as stone or concrete floors get a score of 0 as compared to the availability of natural substrates like an earthen floor. Low score for hard surface is meant to reflect the ill-effects of such substrates on the health of the animal, specifically the feet of an animal as large as the elephant.

Data Processing

The parameters observed and recorded for the elephants have been evaluated and rated as per a defined set of criteria, developed by experts. These values are meant to reflect the welfare status of each elephant. The overall mean rating values which include several sub-parameters have been presented and this is compared with the rating for each location/ elephant/ mahout. This is followed by the mean rating of each sub-parameter.

Each parameter has been rated independently as per defined rules, without considering its relative association with other parameters. Thus, the scores reflect a parameter's individual identity. For each parameter, the mean values were calculated along with the standard error (S.E).

Results

Population status

Of the elephants observed, 24 were females ranging in age from 6 to 57 yrs and three was a single 18 yr old male elephant, resulting in a sex ratio of 0.04:1 (Male: Female). The average age of the elephants was 30.58 (SE. = 0.17, N= 25) with the average height being 248.55 cms (SE. = 0.21, N= 22) ranging from 207 cm to 290 cm. Mean age of females was 31.1y (SE= 3.3, N= 24) ranging from 6-57y.

Status of Shelter

Fifty seven percent of the enclosures were made of concrete or RC material while 30 % had metal sheet or stone as part of the enclosure. Thatched roof was recorded in three temples

Seventy-five percent of the temples had stone or concrete floors while 21 % had both stone /concrete floors along with mud /sandy floors. There were no shelters with purely mud or earthen flooring. The mean shelter size for the elephants was 943 sq.ft. (S.E= 2.37, N = 13). Minimum area recorded was 6.25 sq.ft. and the maximum was 2500 sq.ft. across the observed temples.

On an average, each animal spent 15 hours within the enclosure (S.E.= 0.0.12, N = 19) with the adult male being confined for 24 hrs from the past six months (upto the period of data collection in August 2005) to its enclosure as he was reported to be aggressive and rough. A 40yfemale was kept in her shelter for 22 hours per day. Minimum duration was 6 hours per day. Reasons for keeping the animal in confinement varied from maintaining safety of the animal to providing rest or for use in temples.

The trees (coconut *Cocos nucifera*, neem *Azadirachta indica*) planted in the enclosure provided shade to the some of the elephants in the temples, while the enclosure itself provided shade for some. An 11.4y female was reported to be kept in the open without shade during daytime. A fan was provided for another female elephant in her enclosure. All the shelters claimed to clean the enclosure at least once a day. Some temples used soap, water or disinfectant to clean the space.

A significant parameter for captive elephants is the status of shelters they are housed in. Unlike free-ranging wild elephants which range across vast distance (Kane, et al., 2005), some captive elephants live in man-made enclosures/ areas.

Six sub-parameters were assessed to calculate the overall value for the 'shelter' parameter. The overall mean rating for shelter was 3.81 (SE = 0.41, N=6) with values ranging from 0.00 to 5.83 for each location. An average of 12% of the sub-parameters were of the yes-no type. A temple, housing a 25y old female elephant was constructed of natural materials with natural flooring and provided protection against weather through a closed type of shelter.

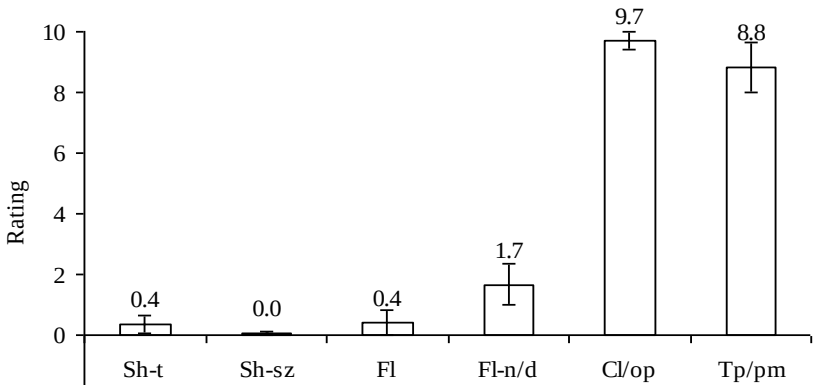
The mean rating for shelter type was 2.2 (S.E. = 0.0.14, N= 20) with 85% of sampled elephants scoring less than 3. These values reflect the following factors: man-made enclosures with non-natural roof material (concrete/ tin roof). The exceptions were two temples with a score of 5 indicating presence of a man-made enclosure made of natural materials.

Home range size of elephants is reported be around 100- 300mKm^2 (Sukumar, 1991). Rating for shelter size was 0.05 (S.E = 0.02, N= 21) with 95% elephants getting a score of 0. Minimum shelter size recorded was 6.25 sq.ft.

Mean rating for floor (Figure 1) type was 0.42 (S.E. = 0.06, N = 24). 95 % of the shelters had hard floors with only one temple providing an earthen floor during day as well as night. Hard floors have been associated with foot problems in elephants (Benz, 2005).

Most of the enclosures (Figure 1) were the closed type, mean rating = 9.72 (S.E. = 0.06, N= 18) with 94 % shelters getting a score of 10. This indicates provision of protection against high temperatures, rain, etc. However, the closed shelters are not considered suitable as they do not provide natural conditions for captive elephants. Still, if captive animals are confined, provision of closed shelters provides protection against extreme weather conditions.

Eight-eight percent of the shelters sampled were the permanent type. This showed availability of a secure place for the animal. This was, however, offset by the attributes of the shelter as mentioned above.



Sh-t: Shelter type
Sh-sz: Shelter size
Fl: Floor type
Fl-n/d: Floor type (Night/ day)
Cl-op: Closed/ open shelter
Tp/ pm: Temporary / permanent shelter

Figure.1: Ratings for shelter for sampled temple elephants

Availability of water for drinking/ bathing

Ninety percent of the temples provided water through taps (from sources such as borewells). Ponds, tanks and rivers were also used for providing drinking water or for bathing the animal. The distance to a water source depended on the number of sources used: tap water at zero distance to the animal while ponds / rivers were situated several kilometers away. The mean distance to a water source not inside the enclosure was 2.75 Km (S.E. = 0.24, N = 8). The maximum distance recorded was 5 km to a river. The tank water used for bathing a temple elephant in one location was observed to be greenish in colour and was reported to be contaminated with detergents as it was also used for washing clothes.

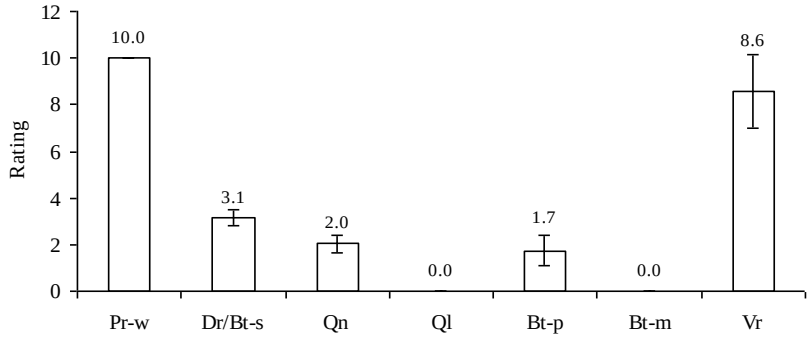
The elephants were reported to be drinking an average of 107 l. of water per day (S.E = 0.47, N = 23). Seventy percent of the animals were bathed within the enclosure itself with a mean duration of 1.43 hrs (S.E. = 0.06, N = 22). Materials used for bathing the elephants were brush, broom and stone. 90 % of the temples used either a brush or brush and broom for bathing the animals. With the provision of borewells, seasonal variation in water availability was reduced.

Provision of water is a major factor for elephants as wild elephants are known to drink water at least once a day (Shoshani and Eisenberg, 1984). This assumes greater importance in the context of a captive situation where a shelter has to make available such facilities and the animal is usually not given the freedom to decide when to drink/ bathe.

Overall mean rating for water related variables were 3.64 (SE = 0.33, N = 7). The values for individual locations ranged from 2.00 to 6.5. The lower score of two was significantly different from the overall mean ($z = 2.01$, $p < 0.05$) indicating poor conditions for water provision.

All the shelters had access to water (mean =10, S.E=0, N= 25). However, mean rating for source of water (Figure 2) with respect to type of water (stagnant/ running) was 3.14 (S.E. = 0.05, N = 25). Eighty percent of the temples scored < 5 for this variable indicating availability of poor quality water. Only four temples had availability of running water.

The mean rating for the kind of bathing materials used was 0 (S.E. = 0, N = 22) reflecting on the use of unsuitable bathing materials. When the quantity of water that these elephants drink was scored, mean value was 2.04 (S.E. = 0.06, N = 23) with 78.26 % of the elephants reported to drink < 150 l. of water a day while in the temples. Only three temples were reported to provide 150-200 l. of water. None of the temples had conducted tests on quality of water (mean = 0, S.E. = 0, N= 13).



Pr-w: Availability of perennial water source
DR/Bt-s: Drinking/ Bathing water source
Qn: Quantity of water consumed
Ql: Tests of water quality
Bt-p: Bathing place
Bt-m: Bathing materials
Vr: Seasonal variation in water availability

Figure 2: Mean rating for water related parameters

Availability of rest, shade and sleep

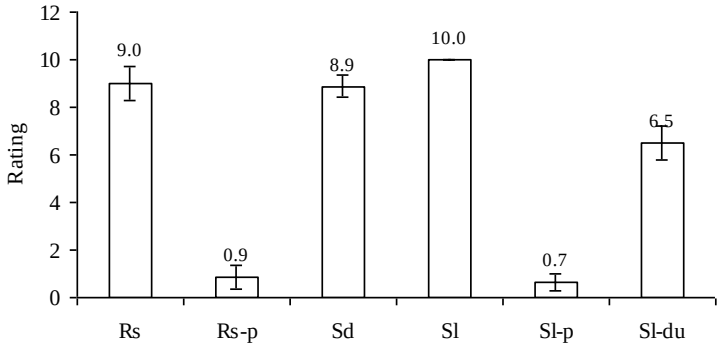
The sizes of resting and sleeping places were the same with a mean of 696sq.ft. (S.E = 1.37, N = 16). Mean duration of sleep was 7.95 hours (S.E = 0.14, N = 21) with 61 % sleeping in the night and 38 % sleeping during the day and night.

All the elephants were accompanied by their mahouts during walks. Mean distance was 4.88Kms (S.E = 0.11, N = 16) with a mean duration of 3.24 hours (S.E. = 0.10, % CV = 0.03, N= 19). The elephants walked on plain surfaces, which was usually road, or within the temple.

Elephants in captivity have limited opportunity to rest or sleep. Their managers/ handlers decide when these elephants can/ cannot rest/ sleep. Mean rating averaged across several parameters (rest, shade and sleep related variables) was 5.99 (S.E. = 0.41, N = 6). An average 53% of the sub-parameters were of the yes-no type. Mean scores for individual locations ranged from 5.00 to 7.80.

Specific Rest, Shade, Sleep parameters

Availability of rest, sleep and shade availability per se get a score of 10. However, scores for related and equally important parameters were low. Mean rating for resting place was 0.88 (S.E = 0.09, N = 17) indicating poor resting conditions with 83.25% of the locations getting a score of 0. The resting places (Figure 3) for three elephants were given a rating of 5.0 indicating availability of natural substrates in the resting place. The results were similar for sleeping place with a mean of 0.65 (SE = 0.06, N = 23) with 86.9% of the shelters getting a score of 0.



Rs: Rest availability Rs-p: Resting place
Sd: Shade availability Sl: Sleep availability
Sl-du: Sleep duration

Figure 3: Mean Rating for rest, sleep, shade parameters

Provision of physical exercise (Opportunity to walk)

Captive elephants, owing to the nature of their captive situation, usually have restricted access to free movement. Hence, provision of physical exercise has been scored. Mean rating for providing exercise to the elephants by allowing them to walk was 9.58 (S.E. = 0.06, N = 24). The mean rating value for nature of terrain on which elephants were made to walk was 0 (S.E. = 0, N = 9) indicating unsuitable substrates. One adult male elephant had not been given an opportunity to walk for the last six months (from March-August, 2005, at the time of data collection).

Training

Tamil, Malayalam, Urdu and Hindi were the languages used to give commands to the elephants. The mean number of commands was 23 (S.E = 0.39, N = 15). Though all the elephants had temple related work to perform, the number of commands ranged from 7 to 50. Training is believed to be an integral part of a captive elephant's life. Scores were designed to reflect easier training period for the elephant and minimum number of commands to learn.

The mean rating for providing training was 1 (S.E. = 0, N = 21). The mean score for number of commands to be learnt was 2.22 (S.E. = 0.12, N = 18) with 77.77% of the elephants getting a score of 0. The rating indicates that the elephants were forced to learn higher number of commands for a longer period of time.

Opportunity for social interaction

Of the animals observed for social interaction, only one was allowed to interact: a 38 yrs old female was allowed 14h interaction with an 8 yrs old female.

Despite the knowledge that elephants need to interact with their own kind, most captive elephants are subjected to a solitary life. The mean rating for prevalence of social interaction was only 0.57 (S.E. = 0.20, N = 7).

Behaviour

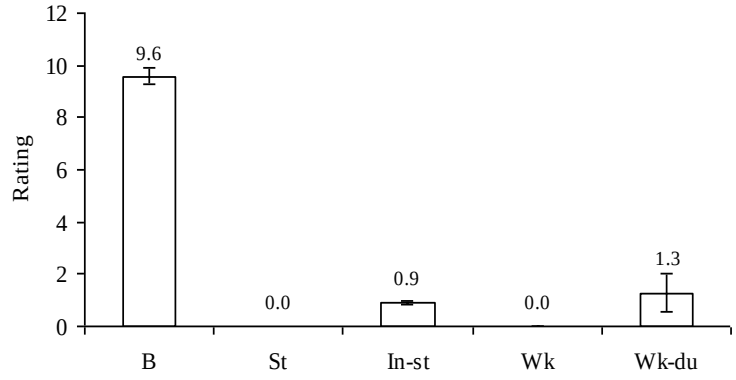
Of the observed elephants, twenty-two were reported to be quiet. Two adult elephants, female and male were reported to be nervous. Among these two elephants, the female had injured one person and the male was aggressive towards his mahout. Stereotypic behaviour observed were ─ ear, trunk and tail movements ─ among twelve elephants.

Lack of opportunity to express species-typical behaviours in a captive situation may be a source of stress (Bradshaw, in press). The mean rating for observed personality was 9.58 (S.E. = 0.05, N = 24) indicating pliant nature of the elephants. However, this may be due to conditioning to be submissive. A related factor of equal importance is the occurrence of stereotypy The mean rating was 0 (S.E. = 0, N = 9) with intensity of stereotypy being 0.92 (S.E. = 0.05, N = 12). These values indicate that elephants exhibit stereotypy with noticeable intensity.

Work parameters

All the elephants belonged to temples and hence work was temple oriented: standing in front of temple, going around it, taking part in temple functions. Mean work duration was 6.54 hours (S.E. = 0.21, N = 13) ranging from no work to 10h/day. Two female elephants were not provided shade, water, food or rest during work.

Work type defines the captive environment of an elephant. Scores were designed such that work type closest to an elephant's natural way of life was given a higher rating. The mean rating for work type was 0 (S.E. = 0, N = 18), while the mean for duration of work was 0.71 (S.E. = 0.12, N = 15). Work type (Figure 4) for temple elephants was to stand in front of the temple with/ without provision of shade. Although this may not seem to be physically demanding for the animal, holding a constant posture of one kind over a long duration on unsuitable substrates will lead to health problems.



B: Observed behaviour St: Stereotypic behaviour
In-st: Intensity of stereotypy Wk: Work type
Wk-du: Work duration

Figure.4: Mean Rating for 'observed behaviour' and 'work' parameters

Provision of food

Ninety-two percent of the elephants were stall fed while two percent were allowed to free range and were provided stall feed. None of the elephants depended on free ranging only, for food. Food types were varied: rice, sorghum, ragi, pongal, pulses, coconut leaves, green fodder, mineral mixture, salt, ghee and sugar. Provision of the three major food types: carbohydrates, proteins and roughage were observed in eight elephants. Mean number of food items was 4.04 (S.E = 0.08, N = 25). Provision of unsuitable foodstuff such as sugar, ghee or spicy food was observed for 17 elephants.

Overall mean rating for food related parameters were 6.31 (S.E. = 0.29, N= 3). Ratings ranged from 5.00 to 8.33, with 24% of the temples scoring 8.33 and 48% of the locations scoring 5.00. Scores for method of providing food, i.e., whether allowed to free range or were stall-fed revealed a mean value of 5.42 (S.E = 0.05, N = 25) with 91.7 % of the elephants getting a score of 5. This indicates most of the elephants are not allowed to forage for themselves in forest conditions, with only two temples allowing their female elephants to free range and provided her with stall-feed.

Mean rating for the type of food given (provision of pulses, carbohydrates and roughage) was 6.25 (S.E. = 0.05, N = 25) indicating provision of less than three types of food (pulses, roughage, carbohydrates) with 68% of elephants getting a rating of 5 indicating provision of only two types of food. Five temples provided all three classes of food types. Average rating for number of food items was 7.2 (S.E. = 0.06, N = 25), which shows that the elephants were given 2-5 items of food.

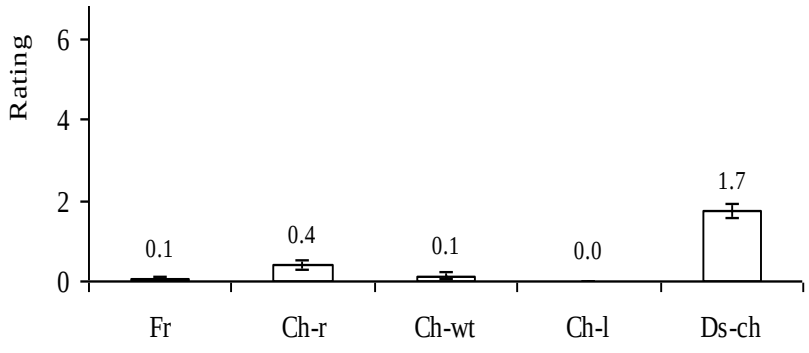
Chaining details

All the elephants observed had chains on their legs with 46 % of the animals having two chains— front legs shackled or front and hind leg chained (N = 19). Mean chain length was 504cms (S.E. = 1.22, N =15), mean chain weight was 43kg (SE. = 0.40, N = 14). An adult male elephant had its two front legs shackled and length of the chain was 300cms. A feature characteristic of captive elephants is the presence of chains and use of the same to restrict movement of the animals.

The overall mean rating for chain related parameters was 0.47 (SE. = 0.21, N= 5). Mean rating for individual elephants ranged from 0.00 to 1.25. There was no significant difference among the elephants for this feature. Constant and prolonged chaining can prove to injurious to the animal's skin (Kurt and Garai, 2007), may result in increased frequency of stereotypy (Gruber, et al., 2000).

Mean score for allowing the elephant to free-range (Figure 5) was 0.09 (SE. = 0.02, N= 23) with 100% of the sampled elephants scoring < 1 for this variable. Similarly, when region of chaining was scored, mean value was 0.4 (S.E. = 0.04, N = 20) specifying use of more than one region of chaining for 95.7% of the animals and one region chaining for all sampled animals.

The parameter 'chain weight' averaged 0.14 (S.E. = 0.04, N= 14) with 85.71% of the temples using chains weighing greater than 10 kg.



Fr: Free-ranging status Ch-r: Chaining region
Ch-wt: Chain weight Ch-l: Chain length
Ds-ch: Distance to chaining place

Figure.5: Mean Rating for 'chaining' parameters

Reproductive status

Forty-two percent of the observed elephants were not in oestrus cycles while the status was not known in 25 % of the animals. 25 % of the animals were reported to be cycling. However, none of these animals were exposed to males. The male elephant in one of the temples was reported to have been in Musth.

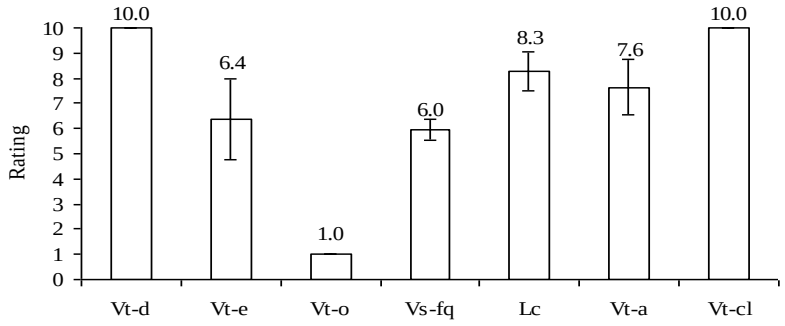
It is assumed that a reliable indicator of health is the reproductive status of a captive animal. Mean rating for the occurrence of oestrus cycles was 3.33 (S.E = 0.28, N = 9). 66.7% of the sampled female elephants were not cycling, with only three elephants said to be in oestrus cycles. The mean for exposure to males was 0 (S.E = 0, N = 8). The lone male elephant in this sample was reported to be in active reproductive status and in Musth; however, no data was available for exposure to females or number of calves sired.

Veterinary treatment routine

Ribs were not visible for all the elephants observed (N = 21). Scapula was reported to be spinous, not visible for 91% of the elephants while 9 % had their scapula partially visible or visible. Of the twelve elephants observed, elasticity of skin was described as slow for ten while it was quick for two animals. Vaccination was provided against anthrax for twenty-two elephants. A 37y old female elephant was reported to have opacity of the eye for which treatment was being given. All the temples (N = 25) had access to a veterinary doctor with 16 locations having access to a doctor on call with a mean distance of 3.94kms (S.E. = 0.14, N = 16). Ten locations maintained medical records along with insurance particulars in some cases. Adherence to the veterinary routine prescribed for the captive animal (for the observed period) was scored. Overall mean rating for this feature was 9.84 (SE= 0.17, N= 3). An average 35% of the sub-parameters were of the yes-no type. Individual mean values ranged from 6.667 to 10.

Veterinary doctor - Availability and facility

The mean value for veterinary facility (availability of doctor, doctor's experience, availability of clinic facility, etc.) was 6.84 (S.E. = 0.38, N= 7). The individual mean rating (Figure 6) ranged from 4.6 to 9.5. This may indicate that a significant variation in the kind of veterinary facility available. However, even with access to a veterinary doctor in all the locations, 50% of the doctors did not have any elephant experience.



Vt-d: Veterinary doctor availability
Vt-e: Veterinary doctor's elephant experience
Vt-o: Experience with other animals
Vs-fq: Frequency of visits
Lc: Distance to elephant location -
Vt-a: Veterinary assistant availability
Vt-cl: Veterinary clinic

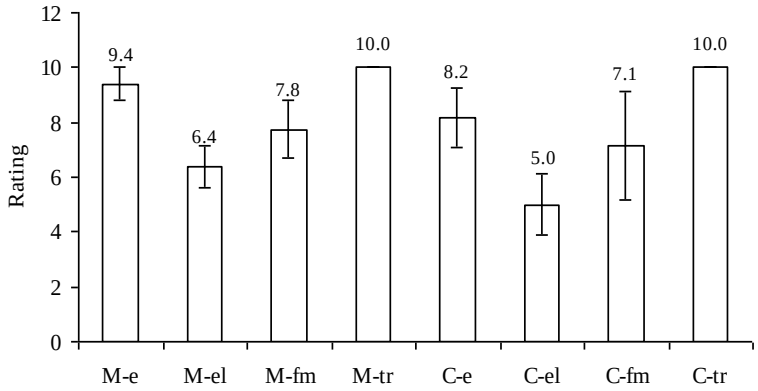
Figure.6: Mean Rating for 'Veterinary Doctor Availability and facilities' parameters

Mahout's socio-economic status and experience with elephants

The welfare status of a captive elephant is directly linked to the Mahout/ Cawadi's relationship with the animal. In addition, welfare is indirectly linked to the mahout/ cawadi's socio-economic status, as inadequate income or poor housing facility may show up in the form of bad handling of the animal. The Mahout/ Cawadi's welfare status was assessed using 16 different parameters such as experience as an elephant handler, education level, salary per year, marital status, availability of accommodation, etc. An average of 26 % of the parameters were of the yes-no type. Mean age for mahout was 41.5 yrs (SE. = 0.27, N = 25) and for cawadi, mean age was 36. .9 yrs (SE = 0.43, N = 15).

Mahout/Cawadi experience

The overall mean rating for mahout experience (Figure 7) was 8.39 (S.E = 0.44, N= 4) ranging from 2.5 to 10. The overall mean rating for Cawadi experience was 7.58 (S.E = 0.48, N= 4) ranging from 3.33 to 10. Twenty one percent of the cawadis scored 10 for this feature.



M-e: Mahout experience
M-el: Mahout's elephant experience
M-fm: Mahout's family occupation
M-tr: Mahout training
C-e: Cawadi experience
C-el: Cawadi's elephant experience
C-fm: Cawadi's family occupation
C-tr: Cawadi training

Figure 7: Mean rating for 'Mahout/ cawadi experience' parameters

Use of tool to control elephant

The mean rating for the use of tools by Mahout was 3.9 (SE= 0.12, N=19) indicating prevalence of use of tools. Also, mean rating for tool type (Ankush, wooden stick, etc) was 0.46 (SE. = 0.06, N = 12).

Socio-economic status

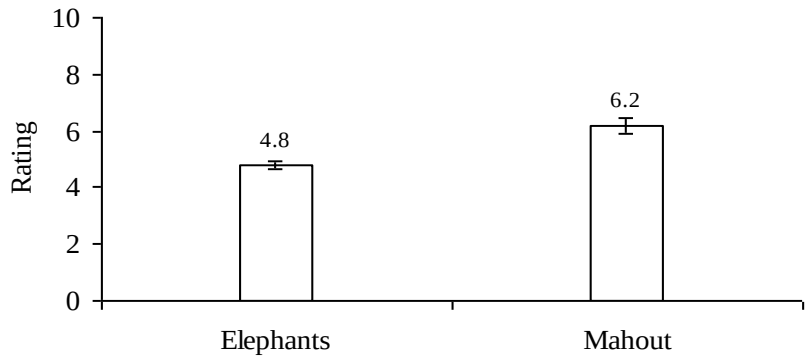
Mean wages for mahout was Rs. 17,218/ year (S.E. = 6.25, N = 22). Mean rating for Mahout's salary was 1.23 and Cawadi salary was 0.25. These two values indicate insufficient wages in each profession, as any value below 3 is considered poor. Mean rating values for Mahout and Cawadi education status were 7.06 and 6.87 respectively indicating a few years of schooling. Average number of children for mahout was 2 (S.E. = 0.10, N = 16) while average for cawadi was also 2 (S.E. = 0.16, N= 10).

Accommodation availability

The mean rating for Mahout and Cawadi for accommodation availability was 7.86 (SE = 0.159, N = 13) and 7.14 (SE = 0.368, N = 6) respectively.

Overall welfare status of temple elephants and their handlers

The overall mean rating for elephants across all the parameters observed was 4.8 (SE = 0.14, N= 967). The overall mean for mahout/ cawadi (calculated across each individual score for each parameter) was 6.2 (SE. = 0.26, N= 282). The welfare ratings for handlers may be different from the welfare ratings of elephants (Figure 8). This may suggest that the welfare status of Mahout/ Cawadi may be relatively better than that of the elephants.



Mahout: includes both mahout/ cawadi

Figure8: Comparison of overall mean rating between elephants and handlers

Discussion

Overall status of captive elephants in Temples of Tamil Nadu

1. Seventy five percent of the sampled elephants got an overall mean rating for 'shelter' parameter less than the group average of 3.81. Rating values less than three for individual elephants for shelter were observed for eight temples.

2. All the elephants had access to water. 76% of the elephants had access to stagnant sources of water, scoring less than 3 for this feature. 78% of the elephants scored less than 3 for the amount of water consumed indicating less than ideal consumption. 100% of the shelters used hard, unsuitable materials while bathing the elephants. 71% of the shelters used the elephant's enclosure as a bathing place also. Rating values less than three for water availability and use were observed for nine temples.
3. Hundred percent of the sampled elephants were reported to be allowed to sleep. However, 87% of the shelters scored 0 indicating provision of unsuitable sleeping place for its animals. Similarly, 82% of the shelters did not provide suitable resting place as seen in the score of 0.
4. 77% of the shelters were given a rating of 10 indicating provision of shade.
5. Ninety five percent of the sampled elephants had access to physical exercise by walking. However, one adult male elephant, had not been allowed to walk for six months (from March to August, upto the time of data collection) due to his aggressive behaviour.
6. Seventy seven percent of the elephants were trained to respond to more than ten commands.
7. Eighty five percent of the seven elephants observed did not have access to social interaction with other elephants.
8. Almost all the elephants (91%), were reported to be calm. However two elephants, male and female, were reported to be aggressive. Twelve elephants were reported to exhibit stereotypic behaviour with noticeable intensity showing a rating of less than three for individual elephants for occurrence of stereotypic behaviour
9. All the sampled elephants were given a score of 0 for type of work indicating the unnatural nature of work performed by them. Also, most of the elephants (93%) scored less than 1 for work duration.
10. Ninety percent of the elephants were not allowed to forage for themselves.
11. All the sampled elephants were given a rating of less than two for chain related features such as: allowed to free-range or not, region of chaining, chain weight and chain length.
12. Only three of the sampled female elephants were reported to be in oestrus cycles, however, two of these elephants were not exposed to males.
13. Adherence to the prescribed veterinary schedule was given an overall mean rating of 9.84— indicating maintenance of a veterinary schedule for the observed period. At the time of this report, a 38y old female elephant had reportedly died.
14. All the temples had access to a veterinary doctor. But, 50 % of the doctors did not have experience with elephants.
15. Most of the mahouts (94%) and cawadis (72%) had a minimum of 10 years experience in the profession. However, there was significant variation in the years of experience that some Mahouts/ cawadis had in their profession.
16. Eighty six percent of the Mahouts and all the cawadis were given a rating of less than two for salary, indicating insufficient wages.
17. Sixty-three percent of the mahouts were reported to be using tools while making the elephants respond to their commands.

The overall mean rating, considering all the observed temples together, was 4.8 implying poor welfare conditions for the elephants. The data revealed absence of natural/ semi-natural conditions for the elephants among the observed temples. There was no provision for ecological and behavioral needs of elephants integral to their continued psychological

and physical health: the vast space that elephants are known to traverse was limited to a maximum of just 0.1 acre among these elephants, they were provided with unsuitable flooring and confined within for more than ten hours per day; no provision for access to water when the elephants needed to drink/ bathe; all temples, except one, maintained their elephants singly, hence, all associated features of their social behaviour was absent in these temples; poor or absent reproductive functioning among adults either due to absence of oestrus or due to absence of members of opposite sex; the elephants' living conditions were characterized by features provided and controlled by people. Control by the elephants was minimal or absent.

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Tamil Nadu Forest Department (TNFD): The Tamil Nadu Forest department is the custodian of 22,865 sq. km. of forest land and invaluable wildlife in the state of Tamil Nadu. Tamil Nadu, therefore, has adopted a compelling vision to inspire people to protect wilderness, the ecological diversity and species richness. The Tamil Nadu State Forest Act, 1882, The Wildlife Protection Act, 1972, Forest Conservation Act, 1980 and a host of rules formulated under these Acts are being implemented by the Forest Department. Adhering to the best scientific principles and incorporating traditional knowledge, new socio-economically and ecologically sound paradigms for managing forests and wildlife have also been incorporated into the management strategies adopted by this department

Hindu Religious and Charitable Endowment (HR&CE) Department, Government of Tamil Nadu: The Hindu Religious and Charitable Endowments Act, 1951 was enacted provincialising the administration of the Hindu Religious Institutions. For a considerable period of time, including elephants, many species of animals have been considered to be integral parts of these institutions and the presence of different species signifies the cultural and traditional values the institutions. The department has evolved and also practicing specific management guidelines for these animals' upkeep and welfare.

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 in alleviating suffering at the hands of humans. CUPA does not differentiate between pet, stray or wild animals, since all often require assistance and relief from cruelty, neglect and harm. The organization's objective has been to design services and facilities which are employed fully in the realization of these goals.

Asian Nature Conservation Foundation (ANCF) is a non-profit public charitable trust set 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 co-ordination with Government agencies, research institutions, conservation NGOs and individuals from India and abroad, in all matters relating to 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 forums.

A.V.C College: In 1955, the Anbanathapuram Vahaira Charities [A.V.C] founded the A.V.C. College (Mayiladuthurai, Tamil Nadu) to serve cause of higher education and the reputed service of the college is well recognized throughout Tamil Nadu and other parts of our country. Presently, the Department of Wildlife Biology at the college has a research department conducting full time and part time in Doctor of Philosophy (Ph.D), Master of Philosophy (M.Phil) and Master of Science (MSc)

programmes. The department has a reputation of initiating and successfully running many major and minor research projects in Wildlife Science and Conservation funded by reputed National and International funding agencies.

World Wide Fund for Nature (WWF) is one of the world's largest and most respected independent conservation organisations. Its mission is to stop the degradation of the plant's natural environment, which it addresses through its work in biodiversity conservation and reduction of humanity's ecological footprint. It has been working on these issues in India for over four decades now.

People for Animals also known as **PFA** is India's largest animal welfare organization with a nationwide network of hospitals, units and members. PFA has strong network of compassionate, committed and courageous people who protect animals against cruelty and work to bring about a change in attitudes, laws and lifestyles towards improving conditions for animals. PFA sets up and run shelters, ambulance services, sterilization programmes, treatment camps and disaster rescue missions for animals. PFA conducts education programmes in schools, fight cases in court and lobby on animal issues in parliament. At present, we have a nationwide network of 165 units, 26 hospitals and 60 mobile units. The Chennai Chapter of PFA was started in 1995.

Animal Welfare Foundation, Madurai (AWF) was established in Madurai, Tamil Nadu to rescue abandoned animals and provide food to stray dogs and other animals. It has initiated and participated in the animal birth control programmes for stray dogs and also provides shelter for animals, prevents cruelty, conducts free veterinary service and health camps and adopts and re-homes old animals. An important activity is to collect data on temple elephants and monitor their living conditions and welfare.

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 organizations in 153 countries. WSPA brings together people and organizations throughout the world to challenge global animal welfare issues. It has 13 offices and hundreds of thousands of supporters worldwide.

Photo credit: Front cover (clockwise), 1, 3, 4, 5, 6, Figures 5c, d, 11b, 14c, 26d, and back cover (clockwise) 1: Kalaivanan, Figures 5e, f, 14e, f, 16c, d, 20c, d, 21b, back cover (left to right) 1,2,3, and 4: R. Thirumurugan, Figures 1a, b, c, 5a, b, g, h, 7a, b, d, d, 11 a, c, 14 a, b, d, 16a, b, 18a, b, c, d, 20a, b, 21a, 24a, b, 26a, b, c, e, 27a, b, Front cover (clockwise) 2 and back cover (clockwise) 2: Surendra Varma,1d: Venketesh

Unlike their counterparts in the wild, elephants kept in captivity undergo different set of living conditions. The welfare status of the elephants, and the socio-economic status and professional experiences of elephant handlers in three institutions: Forest Camps, Temple and Zoo in Tamil Nadu, are highlighted through this investigation. This investigation traces the level of deviations elephants have to undergo if they are kept in human influenced and unnatural conditions.

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Animal Welfare Foundation Madurai

People For Animals

WSPA World Society for the Protection of Animals