Captive elephants in Forest Camps of India

An Investigation into the Population Status, Management and Welfare Significance

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Preface

Forest camps (FCs, primarily owned by the State Forest Departments) with captive elephants is an artifact of the timber-extraction procedure established during the British rule. Elephants in FCs are mostly in idyllic extensive conditions of free ranging, have scope for interactions with other elephants, bathe in rivers and lakes and breed with both camp and wild elephants. Their main work is the carrying of visitors and tourists, participating in *koonkie* operations and patrolling protected areas as part of anti-poaching operations. Their lives in forest camps are rarely marked by stress except due to work sourced by tourism and mitigation of Human-elephant conflict (HEC) where they have to play an active role, often for days on end.

For this investigation, a total of 363 elephants belonging to FCs across five states — Assam, Karnataka, Kerala, Tamil Nadu and West Bengal— and one Union Territory (Andaman Islands) were observed. The British, to harvest timber for mainland use, brought captive elephants to Andaman from the mainland and until a ban on timber extraction was imposed in 2001, harvest of timber and using elephants for this purpose continued even under the Indian government. Assam, along other north eastern states of India, is viewed as one of the last strongholds of the Asian elephant in both captive and wild elephant; less than 1500 continue to thrive in captivity in this state.

There are about 163 captive elephants found in Karnataka and the majority of them belong to the forest department; the department has captive elephants at its major Forest Camp sites like Bandipur, Nagarahole, Sakrebyle and Dubare. There are five forest camps in Kerala and each has its specific objectives. The state of Tamil Nadu (T.N.) is home to around 150 captive elephants. Forest camps have a very long history of elephant keeping in this state, primarily maintained to harvest forest wood and also acting as a source for providing elephants to other institutions. Currently, FCs have only a few breeding females as a consequence of many being transferred or sold to zoos/ temples. In West Bengal, Jaldapara is the last remaining habitat for the Greater One-horned Rhinoceros (Rhinoceros unicornis) and captive elephants in forest camps are use used for patrolling these forests.

However, a common view about captive elephants in forest areas is that the animals are underutilized and use up the inadequate resources available to the department; they do not contribute in any way to income/resource generation. This in turn has led to decisions to involve such elephants in activities alien to an elephant's natural behaviour: use for joy rides, in religious/ ceremonial functions, even in games such as polo or football. These activities not only bring in issues of stress and reduced welfare for the elephants, they do not add to the concept of conservation. Involving captive elephants in patrolling forests would provide a near-natural environment for the animals; when the elephants are not used for patrolling, they are allowed to range-free in the forest to engage in species-specific activities with opportunity available for mating with their wild counterparts.

There have been no scientific investigations of the existing status of these captive elephants, their distribution, management and welfare profile; and this investigation on captive elephants from forest camps, may act as the first ever attempt at a detailed investigation on the species in captivity. Efforts were made to visit every single elephant found in these camps and the data was processed by two approaches. One approach was use of a rating scale developed by experts

based on their concept of the importance of a particular parameter to an elephant; this was used in some sections of this document. In some sections, the welfare features or parameters have been rated using a second approach, namely, 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 was 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.

This document has seven sections: section one, deals with overall population status, management and welfare of captive elephants that were investigated in Andaman, Assam, Karnataka, Kerala, Tamil Nadu and West Bengal. The first section along with the executive summary also provides recommendations for the states. Section two describes welfare status of elephants and handlers in Andaman, section three is for Assam, section four for Karnataka, section five is for Kerala, six details welfare status of elephants from forests camps of Tamil Nadu, and seven covers West Bengal. Given the differences in management approaches within these sections, for example, for elephants from forest camps of Kerala, sub-sections were evolved with the assumption that they may provide insights into distinction in administration within the same management regimes with possible consequences on welfare of the elephants.

Captive elephants in Forest Camps exist in near natural environment as a consequence of their proximity to forests However, there may be lack of transparency in the objective of establishing forest camps― whether they contribute to conservation or welfare. We assume, the results obtained through this investigation may provide scope for understanding some of the objectives.

Section 1:
Captive elephants in Forest Camps of India

Executive Summary

Forest Department camps across India maintain elephants for many years. These elephants were very actively used for commercial timber operation, currently are used for patrolling the forests, tourism; weed control, 'kunkie' kumkioperation, conservation education and training.

This investigation is part of an All India Captive Elephant survey carried out from 2005 – 2011 to collect relevant data on forest camp elephants for assessing elephants' welfare status and also to investigate the professional experience of handlers and their socio-economic profile

Data covering different welfare aspects of elephants and handlers was collected by direct observations of elephants and through interview of relevant personnel. The data was analyzed by comparing various 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.

Three hundred sixty-three elephants belonging to FCs across six states such as Andaman, Assam, Karnataka, Kerala, Tamil Nadu and West Bengal were observed. Mean age of observed females was 29.4yrs, ranging from 7months to 82yrs; mean age of males was 27.1 yrs

The ratio of males to females suggested a female dominance with more than one female for every male among calves (less than 1yr; 1M: 3.5F) and juveniles (up to 5yrs; 1M: 1.3F) and among older adults (more than 40yrs; 1M: 1.6F) and seniors (more than 60yrs; 1M: 1.9F).

Of 325 elephants, 46% were captive born; 31% of elephants were wild caught, 10 % of elephants were rescued and 14% were purchased. Mean Rating (MR) was 3.2 implying a deviation of 50% from Expert Rating (ER).

Forest was the shelter for 89% of elephants, with free-ranging allowed for some duration and 10% were kept in forest areas, but tied to trees and 1% were confined in enclosures with vegetation. Two percentages of elephants were exposed to concrete floors for at least some part of the day. MR was 6.6 with a deviation of 18% from ER.

Rivers/streams were the water source for 62% elephants, river was the bathing place for 82% of the elephants; brush/brick/stone formed one of the materials used as scrub for 38% of the elephants. Distance to water was less than 1km for 66% elephants and MR was 5.2 implying a deviation of 35% from ER.

Ninety seven percentages of elephants were provided opportunity to walk, mean distance covered was 7km. Mean duration for walking was 4.5hrs and MR was 6.7 with a deviation of 26% from ER.

Eighty one percentages of elephants were given opportunity to interact, mean duration of interaction was 13.5hrs, mean group size was 6 and MR was 5.6 with a deviation of 30% from ER.

Eighty eight percentages of elephants were chained as well as allowed to range-free, spikes/hobbles were used for 85% elephants and mean chaining duration was 11.0hrs. MR was 2.6 showing a deviation of 68% from ER.

Fifty nine percentages (n= 305) of elephants were used for work and work type ranged across patrolling/ fodder collection, tourist rides, as koonkie for weed removal, timber related work, gathering palm fruits. MR was 4.9 with a deviation of 39% from ER.

Ninety five percentages of elephants were provided foraging opportunity in the forest as well as given stall feed and ration chart was maintained for 67% (n= 226) of the elephants. MR was 5.4 showing a deviation of 33% from ER.

Occurrence of oestrus was reported for 71% elephants. Reproductive activity or occurrence of musth was reported for 84% elephants. Ninety percentages of elephants were isolated/chained during musth and 14% of male elephants had sired offspring. MR was 4.6 with a deviation of 43% from ER.

Of 176 instances of presence/absence of disease/injury, 10% was due to eye problems, 33% foot or leg problems, 9% due to abscess, other medical problems (anemia, GI problems, Urinary problems, respiratory problems, worms, and wounds) accounted for 48% and 1% due to tuberculosis. Veterinary doctor was available for 99% elephants and frequency of visits was daily 30%, weekly/fortnightly 45% and on call or monthly was 25%. MR was 5.8 showing a deviation of 28% from ER.

Mean professional experience was 15 years, mean experience with recent elephant was 8.3 years and 43% handlers opted for this profession as an employment source, 34% as a traditional occupation, 20% out of interest, 1% each as a combination of employment and interest or traditional occupation and 0.5% due to a combination of tradition and interest. MR was 5.6 with a deviation of 38% from ER.

Mean annual income was Rs.58, 856/-, mean number of children per family was 3 and 50 % of handlers were covered by insurance. Sixty three percentages of handlers reported alcohol consumption. MR was 4.0 showing a deviation of 43% from ER.

Overall welfare rating for Forest Camp elephants was 5.4 showing a deviation of 33% from ER. Despite presence of natural conditions and opportunity to interact with group members/wild elephants, the overall rating showed a deviation of 33%. The one factor that impinged on all other features was chaining. Species-typical expressions can be curtailed when animals' movements are restricted, making other suitable features redundant. To this if work schedule is added, the actual time available for the elephants to engage in their behavioural repertoire is even more limited.

Recommendations
Existing conditions suitable for elephant keeping

- Elephants are provided natural open space with vegetation
- Access to water-bodies like rivers/ ponds
- Relatively less duration of being chained to one place
- Opportunity to browse/ graze in forest conditions during non-summer months
- Provision of natural shade
- Opportunity for expression of species-specific social behaviour and maintenance of near natural group structure as a result of breeding opportunities provided
- Provision for interaction with wild elephants
- Availability of veterinary care and facility

Overall, 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— whether they contribute to conservation or welfare.

If forest camp elephants are maintained for conservation, the relevance 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.

- Camp elephants are also used in rescuing and treating wild elephants which are in distress/indisposed due to human activities
- 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 elephants in their natural environment as well as providing opportunities to observe wildlife
  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.

Negative conditions of elephant keeping in forest camps

- No long-term vision regarding priority of maintaining elephants: for conservation or for welfare of the animals as this entails resource management based on different goals
- Absence of point person accountability at field level: thus, making implementation of any objective problematic
- Rescued/confiscated elephants from different regimes placed along with existing camp animals without quarantine and requisite health checks
- Elephants brought in from different sources to forest camps as a result of confiscation require different handling, care and feeding, which remains unplanned at present
- Camp-sites have degraded vegetation, with less foraging benefits for calves, young ones and aged elephants
- Placing immense importance on the use of elephants for tourist rides does not give elephants time for proper bathing, feeding or even opportunity for suckling a calf
- Quarters of mahouts/kavadis extremely substandard with no hygiene facilities
- No health checks for mahouts/kavadis, rendering them as carriers of zoonotic diseases
- Non-payment of dues to mahouts/kavadis, often resulting in the mis-use of animal food supplies for human purpose

Welfare options for forest camp elephants
One option available for the captive elephants of Forest camps 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 some locations: for instance, in Mudumalai Forest Camp in Tamil Nadu, a highway cutting across the sanctuary may endanger 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 probable reduced survivability of the introduced population.

However, the Anamalai camp elephants in Tamil Nadu and other camps in Assam, Karnataka, and West Bengal, 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.

Suggested changes in management of forest camp elephants:
Camp elephants require extensive management plans and budgets because of the presence of several elephants and animal handlers. Forest camps 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 or any other captive elephant management regimes.

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. 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 in 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.

The forest camps 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.
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.

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.

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

Water

Perennial water source is available for most of the camps; however, the quality is contaminated in some camps due to presence of villages and industrial units (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 of water available for elephants. Regular water tests and water treatment need to be considered.

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, 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; specifically using elephants for tourism should prevented. 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.

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. However, elephants have to be trained properly, there was an incident of an elephant injuring it's eye, while removing a specific species of weed. Any work activity should not compromise the elephant's foraging or its access to food and water.

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. The way the younger generation of mahouts handle elephants in day to day practice appears to be harsh; this needs to be investigated and changed by giving exposure and regular training and a sensitization programme to the mahouts and assistants.

Training can be accomplished without being negative or harsh 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. Interaction between elephant and handler has to be one of respect and trust, not fear and dominance.

Reproduction

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

While successful reproduction in captivity in forest camps is an indicator of good welfare conditions, there is no policy regarding continued maintenance of a captive population and its management,.

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 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 should 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 whether the elephant has been exposed to females.

Veterinary care

Most of the camps have dedicated veterinary care, have veterinary care units, including the presence of a residential veterinary doctor with experience in treating elephants; but, all these aspects are distinctly absent in some camps. needing resident veterinarians 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 of elephants
- 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**
- **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 Forest Camp veterinarian should maintain all data in a health or medical register.

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 (efforts can be taken to use 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 Forest Camp in Karnataka (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 becomes old and hard.

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, in addition, 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 forest camps, 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. A one- or two-day training program has little relevance. The same resources could be utilised better for the welfare of the mahouts/cawadis 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 visits within or outside the state..

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 will 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 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. These elephants require a different management concept with a specific and more care-oriented approach which gradually introduces the elephant/s to its new environment and lifestyle.

> 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.

> Forest 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 and different management regimes. 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 elephants in 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.

In addition to this, the following specific welfare measured to be adopted

- The long-term objective of captive elephants maintained in FCs has to be envisaged for continued maintenance/otherwise of these animals. If such elephants are to be maintained, for whatever reasons, welfare should be of paramount importance in the form of:

  a. More emphasis of reinforcing natural behaviour of the animals; this can have the added advantage of increased success of survival of elephants in the event of their release into the wild
  b. The policy of chaining the elephants has to be regulated to a minimum period necessitated by work or veterinary procedures. Free-ranging opportunity in forest conditions would ensure better welfare for the elephants
  c. Long-term policy for camps has to be envisaged: whether the camp would like to continue its success in adding to the elephant population in captivity; if so, plans for the increased number of elephants have to be set up. The policy of moving "excess" elephants should not break the established social grouping/ relationships among the elephants in the camp.
  d. In West Bengal, Jaldapara and Gorumara are the last remaining habitat for the Greater One-horned Rhinocereos. Captive elephants in forest camps can be used for patrolling these forests, this activity would be in keeping with providing a natural environment for the elephants, providing opportunity to forage and consuming water from streams/rivers/ natural depressions, engaging in social interactions among other elephants in the group (even while patrolling).
  e. While patrolling, some work conditions have to regulated: patrolling on a rotational basis (keeping in mind the social cohesiveness of the group), sufficient rest to be given

f.   Even while patrolling, elephants have to be provided sufficient opportunity to graze/ rest— hence, prior planning regarding the number of days/hours and the distance covered has to be in place

g.   Specific management for "musth" which frees the animal from current practice of continuous chaining. Special musth enclosures can be considered

h.   Care should be taken not to separate family and herd members from each other brought on by posting them to different camps in varied districts.

i.   Specific management for old, nursing, confiscated/ rescued, pregnant and calf elephants –not to be used for tourism, given special food and mahout management

j.   The workload of these elephants must be periodically reviewed so that long term stress does not affect their health and performance.

k.   Elephant foot problems must always be tended to immediately instead of waiting for the situation to worsen before the veterinarians act.

l.   Wild male elephants attacking captive males: though, this appears to be a difficult problem to control, one way would be to allow captive males to range-free at night, a practice followed by some states in the country. Hobbling should not be resorted to while free-ranging, use of drag chains can serve a similar purpose.

m.   Steps have to be taken to prevent poaching of captive male tuskers— this would have to involve Anti Poaching Camps keeping tabs on the movement of its captive tuskers.

n.   Appointment of point person with specific responsibility of managing camp elephants' food/ feeding, daily routine and mahout management

o.   Appointment of head mahout as a point person with accountability for all mahout and elephant field issues

p.   Assess experience/methods used by mahouts in handling elephants. Provide training and professional certification.

q.   Appointment of knowledgeable persons e.g. field biologists, elephant scientists, veterinarians with elephant knowledge, NGOs who can form a policy committee along with department officials, and periodically meet, inspect, resolve issues and report to the Chief Wildlife Warden of the State of given state.

r.   We believe that clear principles of conservation with precise objectives should be set regarding elephant camps. What is the use of elephant camps? How can elephant camps contribute to the conservation of the species? Should elephant camps provide conservation priority over that of welfare? If clear answers are not given to these questions, the management of camp elephants will remain subjective, confusing and will never be satisfactory.

Irrespective of the nature of a forest camp, for conservation or welfare, maintenance of its elephants should ensure maximum possible opportunity to express species-specific behaviours.

Specific challenges
Andaman
The Shekhar Singh report (2002) recommends removal of all exotic species from Andaman Island due to its effect on the native flora and fauna. This may lead to relocation of elephants to main land. This, if done, should ensure:

- If the elephants have to be translocated, family units (both by birth and those observed through behavioural interactions) should not be disrupted.

- Translocation should not involve movement into a facility with no provision for expression of species-typical behaviours in natural conditions.
- Geriatric elephants need to be carefully evaluated for their ability to withstand any shifting; established relationships, if any, should not be disrupted
- Translocation may be avoided: measures can be taken to see that the present population does not increase in number— through the use of birth control methods.

Kerala

Unlike elephant camps in other regions, except for Muthanga elephant in Kerala, the camps are not within or adjoining to forested landscape and each camp in Kerala has specific responsibility; keeping this in mind, specific suggestions are made for each camp in Kerala. Even with the forest cover and other associated aspects, objective of keeping elephant in Muthanga Forest Camp is different and defined suggestions for this camp are also important.

MUTHANGA FOREST CAMP

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

ARIANKAVU FOREST CAMP

- The purpose of keeping the elephant in this camp is timber hauling— this should not over-ride welfare considerations of providing opportunities for the elephant to express its natural behavioural repertoire
- Wild elephants spend most parts of a day foraging and are on the move. Thus, timber hauling activities should not be exclusive of the opportunity to forage in natural conditions for the elephants, considering the physically demanding nature of work for the

elephants. Opportunity to free range in the nearby forests with access to rivers/ streams will be healthy for the elephant (for physical health as well as psychological stimulation) as they engage in species-typical activities

- Considering that the elephant is nearing "retirement" age, it would be appropriate if efforts were made now to initiate a regime where activities that enhance its natural behaviours are promoted. This would help when the elephant is transferred to a care center and exposed to new and unknown elephants and living conditions.
- In the event of transfer of the elephant, its handlers should not be changed, considering the age of the animal. The change of location and handlers has to be gradual, giving opportunity for the elephant to acclimatize.

KODANADU FOREST CAMP

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

KONNI FOREST CAMP

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

- One option could be to release the rescued calves to the wild after forming a socially cohesive, maybe unrelated, unit with a relatively older female elephant. This would involve monitoring the interactions among the elephants which could be done by trained mahouts/ cawadis.
- The other option would be continued existence of elephants in captivity for use in timber hauling/ for tourism. This activity should not impinge on the biological and ecological needs of the elephants. In other words, the emphasis should be on providing near natural conditions (biological and physical) and not on harnessing animals for work or for any other human-oriented activity. Such an approach would be able to provide a factual insight into elephant lives for the general public.
- An exclusive manager to administer the camp is needed
- Timely inflow of funds or measures to implement revolving funds
- Motivation measures to be implemented for boosting morale of mahouts/ cawadies and schemes to improve their welfare

KOTTUR ELEPHANT CARE CENTRE

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

Introduction

Forest camps with captive elephants are a product of the timber-extraction practice established during the British rule. The British, to harvest timber for use on the Indian mainland, introduced captive elephants to the Andaman. Assam is one of the last strongholds of the Asian elephant, both captive and wild; and around 1500 continue to thrive in captivity in the state. In Karnataka, the majority of elephants belong to the forest department; Kerala has captive elephants in five forest camps spread across the state.   Tamil Nadu has a very long history of elephant keeping. The forest camps of Tamil Nadu in addition to maintaining elephants for timber harvesting also act as a source for providing elephants to other institutions. In West Bengal, captive elephants in forest camps are used for patrolling forests, particularly in the last remaining habitat for the Greater One-horned Rhinoceros (Rhinoceros unicornis).

There have been no scientific investigations of the existing status of these captive elephants, their distribution, management and welfare profile; and this investigation on captive elephants from forest camps is an attempt to get a detailed picture on the species in forest camps across India.

Objective

The 2005 – 2010 All India Captive Elephant survey (conducted by CUPA-ANCF-WSPA) collected relevant data on forest camp elephants:

- To assess elephants' welfare status in terms of physical, social, psychological, health and veterinary care parameters
- To assess the professional experience of handlers (mahout/assistants) and their socio-economic profile

Method

An All India Captive Elephant Survey was launched in 2005 with the joint participation of World Society for Animals (WSPA), U.K., Compassion Unlimited Plus Action (C.U.P.A.), Bangalore and Asian Nature Conservation Foundation (A.N.C.F.), Bangalore. Information regarding elephants and handlers was collected by direct observation and through interview of relevant personnel (Figures 1a, b, c, d, e, f, g and h). This was achieved by involving teams of volunteers drawn from educational institutions/ nature clubs. The teams were given short-term training by experts from A.N.C.F. regarding collection of data. A section of the data related to population demography was assessed for the same. Another section was used for assessing welfare status of elephants as well as professional experience/ socio-economic status of handlers.

a

b

Figures 1a, b, c, d, e, f, g and h: Data collection of elephants from different forest camps in India, specific code given for elephant (a), direct observations (b, c and d), body measurements (e), gathering health status detail (f), interviews with elephant handlers (g and h).

Welfare status of elephants

The living environment, physical and biological, experienced by elephants in captivity may impose deficiencies or inequalities from those experienced by their wild counterparts. It is this difference from the wild that has been used to assess the welfare status of captive elephants. A range of captive features, both physical and biological, have been observed and compared with those observed for wild elephants. These features include the physical environment as well as the

social, reproductive and health aspects of the elephants. The greater the difference between captive and wild variables, the poorer the welfare of the captive animal. In addition, veterinary care and health parameters were considered, as any captive situation cannot do without these two important features. As captive living conditions are not uniform across regions/management types, each of the observed variables was rated on a 0 – 10 scale.

The rating method

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

- The experts, based on their concept of 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; n= number of responses) 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.

- Elephants were visited on the ground; data for each parameter was collected by direct observations or with the interviews of people associated the animal. Ratings were assigned to each parameter for each elephant and Mean Rating (M-R) was calculated for a given parameter by averaging across the observed elephants. Thus the Mean Rating (M-R) denotes welfare status of existing conditions on the ground for the particular parameter.

- For example, if an elephant is exposed only to natural flooring, the animal receives a M-R of 8 and for entirely unnatural flooring the value is 0; if an 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.

- 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 regimes represent the average across related parameters observed for the regime. For instance, E-R / M-R for a parameter "shelter" represents 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.
- The same rating logic has been applied to the set of observed features for handlers, viz., comparison of mean rating for each of the observed variables (M-R) with those prescribed by the expert team (E-R). Greater deviation implies poorer professional experience or socio-economic status.
- n refers to number of individuals(elephants/handlers)
- n† refers to number of parameters
- N* refers to number of FCs

Results

Three hundred sixty-three elephants belonging to FCs across six states: Andaman, Assam, Karnataka, Kerala, Tamil Nadu and West Bengal were observed. Mean age of females was 29.4yrs (SE= 1.6, N= 174, ranging from 7months to 82yrs); mean age of males was 27.1 yrs (SE= 1.5, N= 1.5, ranging from 3 months to 90yrs). Figure 2a gives the age-sex class based distribution.
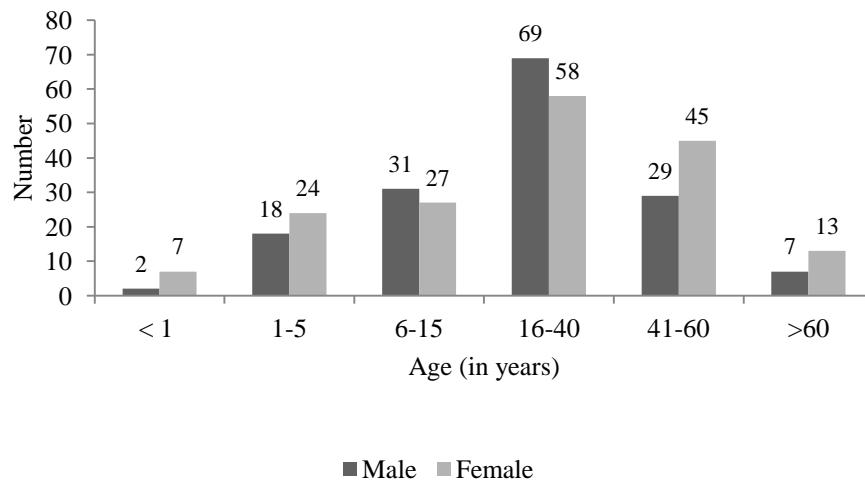
Figure 2a: Age-sex distribution of observed FC elephants

The ratio of males to females indicates female dominance with more than one female for every male among calves (less than 1yr; 1M: 3.5F) and juveniles (upto 5yrs; 1M: 1.3F) and among older adults (more than 40yrs; 1M: 1.6F) and seniors (more than 60yrs; 1M: 1.9F). The M: F ratio is nearly equal to 1 among sub-adults (6-16yrs; 1M: 0.9F) and adults (16-40yrs; 1M: 0.8F).

Source

This parameter is considered to indicate not just acquisition sources but also the change experienced by elephants, viz., greater change is experienced by a wild caught elephant that is brought into captivity.

- Of 325 elephants, 46% were captive born; ratio of M: F was 1:1.2
- Thirty one percentages of elephants were wild caught, ratio of M: F was 1:0.6

- Ten percentages of elephants were rescued, ratio of M :F was 1:0.8
- Fourteen percentages of elephants were purchased, ratio of M: F was 1:4.6

MR was 3.2 (SE= 1.5, N*=4) implying a deviation of 50% from ER.

Among 366 elephants, source was not known for 37 elephants. Figure 2a shows source of acquisition within forest camps. In terms of ratio of Captive Born elephants to other types (combination of Capture, Rescue and Purchase), captive births were highest for West Bengal FC (1: 0.5) followed by Assam (1: 0.7) and Andamans (1: 0.9). Captive births were the lowest in Kerala FC (1:8) followed by Karnataka (1: 2.1), TamilNadu (1: 2.4). There were no captive births in Gujarat. In terms of ratio of Captive births to Purchase, Andaman FC showed higher number of purchases (1: 0.9), followed by West Bengal (1: 0.5) and Assam, Tamil Nadu (1:0.1). There were no purchases reported for the other FCs. In terms of captive birth to capture from the wild, higher captures were observed for Kerala (1:3), followed by Tamil Nadu (1:2), Karnataka (1:1.8) and Assam (1:0.5).
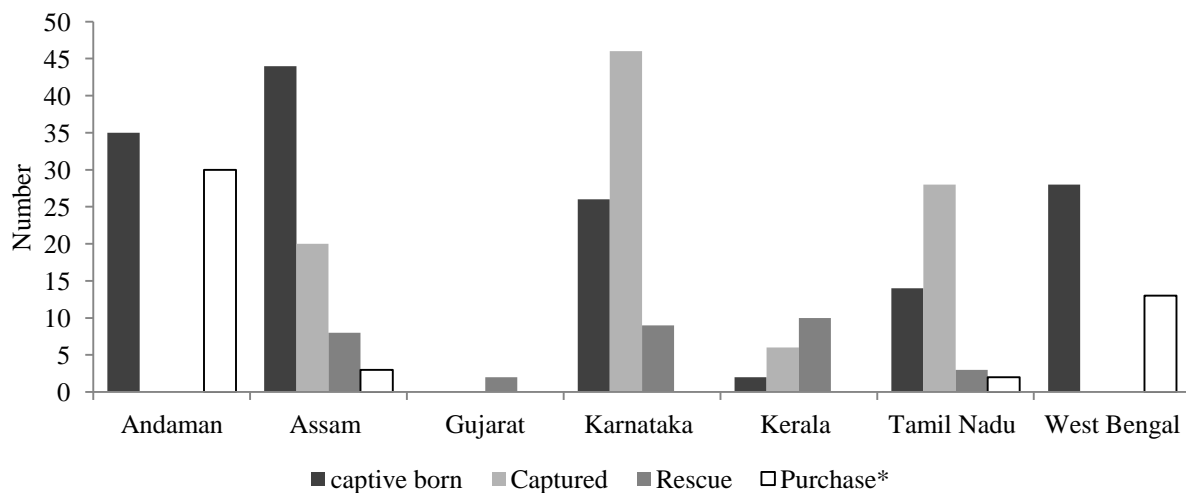
*: Purchased: refers to elephants which are traded as well as exchanged or gifted

Figure 2b: Source of FC elephants

Shelter

By their very nature, forest camps based in/near forest areas provide natural physical space for their elephants. This may, however, be offset by managerial decisions such as fettering the elephants or use for work.

- Forest was the shelter for 89% (n= 296) of elephants, with free-ranging allowed for some duration; 10% were kept in forest areas, but tied to trees and 1% were confined in enclosures with vegetation
- Two percentages (n= 210) of elephants were exposed to concrete floors for at least some part of the day (Figures 3a, b, c, d, e, f, g and h)

a

b

c

d

e

f

g   h

Figures 3a, b, c, d, e, f, g and h: Shelter provided to elephants from forest camps across India; forest as shelter (a, b, c, d, and e), manmade structure as shelter (f) exposure to mud floor (g and h)

MR was 6.6 (SE= 0.7, N*= 6) with a deviation of 18% from ER.

Water

Availability of running water sources (rivers/streams) and opportunity to access these sources enable elephants to consume or use this water when needed. Bathing places such as rivers/streams will not only be less contaminated but also provide greater opportunity to engage in species-specific activity such as wallowing in mud.

- Rivers/streams were the water source for 62% (n= 335) elephants;
- Water source where river/stream was not available such as (ponds/lakes/tanks/tap water/well/pots) was available for 9%; lakes/tanks (with tap-water/borewell) formed 13%; ponds formed 2% and tap-water/wells (along with lakes) formed 2%
- River was the bathing place for 82% (n = 257) of the elephants; brush/brick/stone formed one of the materials used as scrub for 38% (n=285) of the elephants
- Distance to water was less than 1km for 66% (n=256) elephants

a   b
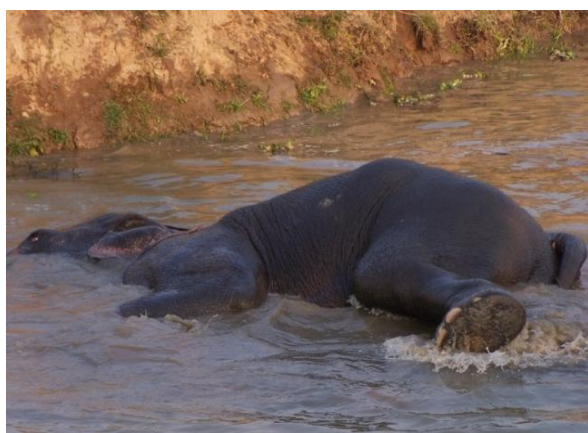
c   d

e   f

Figures 4a, b, c, d, e, and f: Sources of water for elephants from forest camps; perennial water source (a, b, c, d and e), well as source of water for a forest camp (f).

MR was 5.2 (SE= 0.5, N*= 6) implying a deviation of 35% from ER.

Walk

Provision of opportunity to walk on suitable substrates will help in expression of species-typical tendencies; foraging forms a major activity of wild elephants (Sukumar, 1991) and by consequence, walking would constitute an important activity.

- Ninety seven percentages (n = 229) of elephants were provided opportunity to walk
- Mean distance covered was 7kms (SE= 0.4, n= 185)
- Mean duration for walking was 4.5hrs (SE= 0.3, n= 127)

MR was 6.7 (SE= 0.8, N*= 5) with a deviation of 26% from ER.

Social interaction

Social interaction is woven into the multi-tiered society of elephants, specially females and dependent males— forming the basis for learning survival skills. In captivity, the presence of other elephants in a group may not ensure species-typical interactions due to the elephants being fettered or being separated in space and time.

- Eighty one percentages (n= 341) of elephants were given opportunity to interact;
- Mean duration of interaction was 13.5hrs (SE= 0.6, n= 278)
- Mean group size was 6 (SE= 0.4, n= 288)-Figures 5a, b, c, d, e and f)

a

b

c

d

e

f

Figures 5a, b, c, d, e and f: Scope and sources of social interaction available for captive elephants from forest camps in India, interactions among two adult females (a) two sub-adult females (b) among juvenile females (c) among mothers and calves (d and e) and among different age and sex classes (e)

MR was 5.6 (SE= 0.6, N*= 6) with a deviation of 30% from ER.

Chaining

A way of controlling captive elephants is through the use of chains, the presence of near natural conditions may not amount to much if the elephants are chained or fettered. Free-ranging opportunity may be hampered by the use of hobbles on the elephants.

- Eighty eight percentages (n= 268) of elephants were chained as well as allowed to range-free
- Spikes/hobbles were used for 85% (n= 158) elephants
- Mean chaining duration was 11.0hrs (SE= 0.5, n=105)
- Forty nine percentages (n=122) of elephants were chained between 11-15hrs; 20% between 6-8hrs; 16% between 16-24hrs; 15% between 0-5hrs (Figures 6a, b, c, d, e, f, g, and h)

a

b

c

d

e

f

g

h

Figures 6a, b, c, d, e, f, g and h: Types of chains used for elephants kept in forest camps, drag chains (a, b, c and d), legs hobbled (e, f, g and h)

MR was 2.6 (SE= 0.4, N*= 6) showing a deviation of 68% from ER.

Observed behavior

Incidents of killing /injury or expression of stereotypy have been reported among captive elephants. Their temperament can also be described.

- 75% (n= 301) elephants were described as quiet, 2% as aggressive and 23% as quiet and/or aggressive/nervous/agitated/undependable
- 13% (n= 273) exhibited stereotypic behaviour

MR was 6.2 (SE= 0.5, N*= 6) with a deviation of 23% from ER.

Work

In natural condition in captivity, the expression of species-typical behaviours can be put to use through engaging elephants in such activities as patrolling, taking care to see that elephants' opportunity to range-free is not inhibited. On the other hand, use for display by standing in one place for long periods or performance in front of an audience cannot be conducive to expression of species-specific behaviours.

- Fifty nine percentages (n= 305) of elephants were used for work
- Work type ranged across patrolling/ fodder collection, tourist rides, as koonkie, for weed removal, timber related work, gathering palm fruits (Figures 7a, b, c, d, e, f, g and h)

a   b

Figures 7a, b, c, d, e, f, g and h: work types given to elephants from forest camps, attending elephant festival organized by a forest camp (a), used as animal safari (b and c) dragging wood items (e, f, g and h).

MR was 4.9 (SE= 0.4, N*= 6) with a deviation of 39% from ER.

Food

Himmelsbach et al., 2006, cite several authors on the role of poor or insufficient nutrition leading to infertility or poor growth. In captivity, opportunity to forage maybe limited as the elephants are hobbled by their forefeet, hence, care needs to be taken to provide a balanced nutrition.

- Ninety five percentages (n= 313) of elephants were provided foraging opportunity in the forest as well as given stall feed
- Mineral mixture was given for all observed elephants (n= 93)
- Ration chart was maintained for 67% (n= 226) of the elephants (Figures 8a, b, c, d, e, f, g, h, i and j)

a

b

c

d

e

f

g

h

i

j

Figures 8a, b, c, d, e, f, g, h, i and j: Food items provided to forest camp elephants, free ranging (a, b and c), carrying night food (d), stall fed (e, f, g, h, i and j)

MR was 5.4 (SE= 0.6, N*= 6) showing a deviation of 33% from ER.

Reproductive status

Poole and Taylor (1999) mention successful captive births among forest camp elephants. Reproductive status and work schedule have a combined role to play as pregnant elephants cannot be put to work.

- Occurrence of oestrus was reported for 71% (n= 114) elephants
- Mean calf birth per female was 2 (SE= 0.3, n= 80)
- Reproductive activity or occurrence of musth was reported for 84% (n= 105) elephants
- Ninety percentages (n= 48) of elephants were isolated/chained during musth
- Fourteen percentages (n= 59) of male elephants had sired offspring (Figures Figures 8a, b, c, d, e, f, g, h, i and j)

a

b

c

d

e   f

Figures 9a, b, c, d, e and f: Reproductive status of elephants from forest camps, reproductively active males (a and b), females exposures to male (c), calves born to different females from different camps (d and e) lactating mother (f)

MR was 4.6 (SE= 0.3, N*= 6) with a deviation of 43% from ER.

Health status and veterinary facilities

Poor health status may lead to poor welfare and certain foot conditions are known to be associated with unsuitable captive conditions. Maintenance of health is also linked to availability of veterinary care.

- Of 176 instances of presence/absence of disease/injury, 10% was due to eye problems, 33% foot or leg problems, 9% due to abscess, other medical problems (anemia, GI problems, Urinary problems, respiratory problems, worms, wounds) accounted for 48% and 1% due to tuberculosis
- Ninety seven percentages (n= 208) of elephants had been dewormed, 60% (n= 189) were immunized and sample tests of dung/urine/blood was done for 51% (n= 154)
- Veterinary doctor was available for 99% (n= 288) elephants
- Frequency of visits was daily 30%, weekly/fortnightly 45% and on call or monthly was 25% (n= 164)-Figures 10a, b, c, d, e, f, g, h, i, j, k, l, m and n.

a   b

c

d

e

f

g

h

i

j

k

l

m

n

Figures 10a, b, c, d, e, f, g, h, i, j, k, l, m and n: Veterinary expertise and facilities available for elephants in Forest camp; Injuries caused due to chaining of elephants (a), injuries caused by wild elephants attack(b) foot problems reported in forest camps (c and d) male elephant attacked by rhino (e), breaking of tusk due to wild male attack to a male elephant (f),dispensary attached to a forest office and veterinary care facilities (g and h), discussions of veterinary care (i) exploring for a bullet by a veterinary doctor (j), treatment facilities (k) vehicle exclusively attach to veterinary doctor (l) Elephants often used as good darting platform in the medical management of them (m)

MR was 5.8 (SE= 0.2, N*= 6) showing a deviation of 28% from ER.

Overall welfare rating
Overall welfare rating for Forest Camp elephants (MR, considering all parameters together) was 5.4 (SE= 0.4, n[†]= 10) showing a deviation of 33% from ER. Considering the divergence from ER for each of the parameters observed, only one (Chaining) of the ten parameters showed deviation of 50% or more, implying divergence to this extent from norms prescribed by the expert team. Among those which showed deviation of less than 50% from ER, three parameters— water, walk and reproductive status— deviated by around 35-45%. Minimum deviation was shown by the parameter shelter (18%).

Mahout (cawadi) professional experience and socio-economic status
Handlers (mahouts/assistants) who are traditionally associated with this profession and are interested in taking care of elephants are considered to be better suited than others.

Professional experience
- Mean professional experience was 15 years (SE= 0.5, n= 307)
- Mean experience with recent elephant was 8.3 years (SE= 0.4, n= 306)
- 43% (n= 221) handlers opted for this profession as an employment source, 34% as a traditional occupation, 20% out of interest, 1% each as a combination of employment and interest or traditional occupation and 0.5% due to a combination of tradition and interest (Figures 11a, b, c, d, e, f, g, h, i, j, k, l, m ,n, o and p)

a   b

c

d

e

f

g

h

i

j

k

l

m

n

MR was 5.6 (SE= 0.5, N*= 5) with a deviation of 38% from ER.

Socio-economic status
Education level, social habits and economic profile of handlers is an important factor when handlers' welfare is considered.

- Mean annual income was Rs.58,856/- (SE= 1717.2, n= 297)
- Mean number of children per family was 3 (SE= 0.1, n= 281)

- Fifty five percentages (n= 315) of handlers were covered by insurance
- Sixty three percentages (n= 326) of handlers reported alcohol consumption

o   p

Figures 11a, b, c, d, e, f, g, h, i, j, k, l, m ,n, o and p; profiles of experiences, socio economic status of handlers from forest camps of India, examples of different age classes of mahouts (a, b and c) tools used for managing elephants (e and f) mahouts' children (g and h) housing facilities available for mahouts (i, j, k, l, m andn); mahouts' family depending on river, school and with mahouts' children at a school located within the camp site (o and p)

MR was 4.0 (SE= 0.3, N*= 6) showing a deviation of 43% from ER.

Discussion

Male to female ratio shows a trend from greater numbers of calves and juveniles towards decreasing numbers among sub-adults and adults. The trend again is towards greater number of females among elephants aged more than 40yrs. The overall trend shows removal of females from the captive population during sub-adult and adult period. This could be due to death and a more likely reason could be the demand for females in this age group in captivity.

Deviations from ER were less than 50% for most of the observed parameters, except for chaining which showed a deviation of 68% from ER. Despite presence of natural conditions and opportunity to interact with group members/wild elephants, the overall rating showed a deviation of 33%. The one factor that impinged on all other features was chaining. Species-typical expressions can be curtailed when animals' movements are restricted, making other suitable features redundant. To this if work schedule is added, the actual time available for the elephants to engage in their behavioural repertoire is even more limited.

Regarding handlers, experience with recent elephant was nearly half of their total experience in this profession. On the one hand, it implies longer duration with most recent elephant, on the other it shows lesser experience in this profession. If handlers from a traditional background opted for this profession, their total experience in this field would have been more.

Considering the nature of this profession, the chance of injury or death, insurance availability was not provided for all. Added to this, was the mean family size of five persons to be supported by the handlers' income. Parallel to this, more than half the observed handlers consumed alcohol. This would jeopardize the long-term prospects of the handlers' family as well as the elephant.

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Section 2:
Captive elephants in Forest Camps of Andaman

Executive Summary

Forest camps are relics of timber-extraction operations, with the elephants within these camps continuing to be maintained and being used to drag fallen logs/ for tourism/ supervised timber extraction.

This investigation assesses the welfare status of both elephants and their handlers in forest camps of Andaman Islands. Welfare status of the elephants has been assessed by comparing physical/ physiological/ social and psychological features in captivity with those observed in the wild. Based on a welfare rating scale developed by experts, Experts' Rating (E-R) was evolved to collect and compare the same with the Mean rating (M-R) obtained from the ground, that denotes welfare status of existing conditions for the particular parameter.

Source of animal was known for 63% of the elephants of which 25 were purchased and 23 were captive-born; year of purchase free ranged from 1954 to 1995; Locations were Sonepur (Bihar), Assam and within Andaman. Among the captive-born elephants, there were 9 males and 14 females.

All the elephants were maintained in a forest environment with varied vegetation and natural flooring. Space available free ranged from 35, 80 ft^2 (for two elephants) to 5km radius. M-R was 8.0 implying no deviation from E-R.

Streams formed water sources for all observed elephants and the distance free ranged from 20ft to 3km. Bath frequency free ranged from daily to weekly twice with fewer baths in summer and the bath duration free ranged from 10 min to 1.5h, most common duration being less than half-hour (82%). Natural, locally available materials were used as scrub while bathing, with only a few using plastic brushes. M-R was 5.2 showing a deviation of 34.8% from E-R.

Thirty-two percent of the elephants were not provided opportunity to interact. For those getting an opportunity to interact, number of individuals free ranged from 0-3 with 1-2 individuals forming 51% of all the groups; the groups comprised related/ unrelated individuals. M-R was 4.9 showing a deviation of 38.4% from E-R.

Only two females had injured people, while 15 males were reported to have inured/ killed people. Except for a female calf, none of the elephants exhibited stereotypy. M-R was 6.8 with a deviation of 14.5 from E-R.

In 2007, sixty-eight per cent of elephants were not given any work; absence of work was due to the ban on logging in forests. Work for the remaining elephants involved loading/ dragging, three adult female elephants were used for tourism. For tourism: elephants were used for providing rides, bamboo howdah weighing 30-40kgs was used, four people were carried per trip, number of trips depended on tourists (from 1 – 10 trips). M-R was 6.3 showing a deviation of 21.5% from E-R.

Since the Supreme Court's order to resume timber operations in the islands, work has resumed for the elephants in the camps. In 2009, when timber extraction resumed, only 24% of the

elephants were not given any work. Both timber extraction and tourism were the types of work performed. Dragging and loading of logs for durations of 7h/day was done by elephants more than 15y of age. M-R (when logging work resumed) was 5.3 indicating a deviation of 34% from E-R; an increase in the deviation from that observed in 2007.

Three elephants, a calf, a 64y and a 59y old, were not allowed to free range. The calf was given stall feed, while the old elephants were tied to a place in the forest and allowed to forage. Provision of supplements was stopped following ban on logging (banned since 2001 and lifted in 2009); 58% of the elephants were reported to have raided crops; crops eaten were: paddy (*Oryza sativa*), coconut (*Cocos nucifera*), banana (*Musa* sp.), bamboo (*Bambusa* sp.), and sugarcane (*Saccharum* sp.). Provision of stall feed for an elephant was as per the schedule prescribed by the veterinarian. M-R was 4 with a deviation of 51.3% from E-R.

Among the male elephants which were reproductively active/ exhibited musth, 48% were not exposed to females or exposure was not constant, having taken place several years ago. Elephants in musth are chained for the period with one adult male reportedly chained for 8 months. M-R for male reproductive status was 3 with a deviation of 61% from E-R.

Among female elephants, 30% (N= 30) were not exposed to males. Sixteen offspring had died from various causes (abortion/ premature birth/ illness/ man-made) and three females were not bred as they showed aversive reaction to the presence of males. M-R for female reproductive status was 5 indicating a deviation of 34.1% from E-R.

Abscesses on neck/ shoulder, uro-genital problems, diarrhea, respiratory problems were reported among the elephants. Eleven elephants had eye associated problems with five blind in one eye at least. Foot problems such as foot rot/ fissures/ toe nail cracks were reported for eleven elephants with two elephants having fractured their legs.

Oiling was not done for majority of the elephants; deworming was practiced for the observed elephants. Veterinary doctor was available for all observed elephants; assistant was available in some camps. Dispensary with medicines and darting equipment were available in each Free range office. M-R was 6 showing a deviation of 28% from E-R.

Seventy-six elephants observed in these islands were handled by 94 mahouts/ cawadis, the ratio was 1:1.2. Six mahouts took care of more than one elephant with one mahout in charge of the maximum of three elephants. Mean age was 42.0 yrs, ranging from 24-60 yrs.

Mean experience of handlers in this profession was 15 yrs; experience with a specific elephant was 9 yrs, ranging from 0-34 yrs. Only 13.2% of observed handlers opted for this profession out of interest, only two mentioned this profession to be traditional, most chose it as a means of employment. All used tools to control their elephant: Knife/wooden ankush/Stick. M-R was 5 showing a deviation of 49.6% from E-R.

Seventy per cent of handlers did not have relatives in this profession, none of the observed handlers came from a background of handling elephants; agriculture was the most common family occupation. Average annual salary was Rs. 73911, ranging from Rs. 13,000 to 1, 08,000.

Number of children per family free ranged from 1 – 9. Only 12% handlers abstained from alcohol; of those who consumed alcohol, the frequency free ranged from daily, weekly or monthly, after work. M-R is 4, indicating a deviation of 50% from E-R.

Introduction
The natural wealth of the islands induced the British to harvest timber for mainland use, bringing captive elephants into the island to aid in transporting timber. Such harvest continued even under Indian governments, until a ban on timber extraction was imposed in the year 2001.Timber extraction was allowed to resume from 2009 onwards. Forest camps are thus relics of timber-extraction operations, with the elephants within these camps continuing to be maintained and being used to drag fallen logs/ for tourism/ supervised timber extraction.

Objective
The absence of the central reason for maintaining elephants, i.e., timber transportation, in forest camps following stoppage of logging makes it mandatory to assess their welfare status, along with their status when work for the elephants resumed following limited permission to extract timber. Elephant handlers are integral to a captive elephant situation; hence their conditions have also been evaluated.

- To assess the welfare of elephants in forest camps of Andaman islands through an examination of existing conditions, both physical and biological
- To assess the professional experience and socio-economic status of handlers of the elephants

Method
When wild animals are raised in captivity, their living conditions are controlled/ regulated by people. However, the biological and ecological needs of these animals remain unaltered resulting in a potential difference between the species' needs and actual conditions. 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 the welfare. Deviation from the wild state for the parameters observed was rated using a scale developed by elephant experts. Data was collected through observations of elephants/ interview of relevant personnel.

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

- The experts, based on their concept of the importance of a particular parameter to an elephant, developed a rating for each parameter. For example mean expert rating of 8.0 (SE= 0.5, N=29) for the parameter 'floor' and 9.0 (SE=0.4, N=31) for 'source of water' was arrived at, from the ratings suggested by each expert
- A mean rating for each parameter, across all the participating experts, has been used as the Experts' Rating (E-R) which represents the importance attached to a parameter i.e., for a parameter with 8.0 as the maximum value, only 2.0 (25%) deviation and a parameter with maximum value of 9.0, only 1.0 or 10% from the prescribed norm is considered acceptable.
- For example, if an elephant is exposed only to natural flooring, the animal receives a rating of 8 and for entirely unnatural flooring the value is 0; if the animal is exposed to both natural and unnatural flooring, the value is 4 (as 8+0/2= 8/2= 4). If an elephant is exposed to a natural water source such as a river, it receives a value of 9; if the source of water is large lakes or reservoirs, it gets 4.5. A value of 3.5 is assigned for small water bodies like tanks and ponds. Tap water (running) gets 2.5 and if only buckets, pots, and tankers are in use, then the allocated value is 0.5.
- Therefore, using the maxima given by experts as a base, a rating scale starting from zero to the particular maximum value for that parameter has been used and the data for each animal was collected. For a given animal or group of elephants in a given regime (for example, forest camp) 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. The variables have been termed sub-parameters. For example, the variables shelter type, shelter size, floor type in the shelter; all represent different aspects of the physical space provided to the elephant. Hence, they are grouped together to form the parameter "Shelter" and each constituent variable is a sub-parameter. In this investigation, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters. M-R is also based on similar lines.
- E-R and M-R for each of the regimes here represent the average across related parameters observed for that zoo. For instance, E-R / M-R for a parameter "shelter" represent the average of related parameters (termed sub-parameters) such as type, flooring, size, and shade availability. Not all related parameters will be rated for each regime. The number of such related parameters varies for each regime.
- Results have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the parameters observed. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.
- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) have been used to indicate their professional/ socio-economic status, of value to the handler and his elephant.
- N refers to number of individuals and N* refers to number of observed parameters/ sub-parameters

Result

Forest camps from North, Middle and South Andaman, and Havelock Island were surveyed. Data on 76 elephants was collected, comprising 25 males and 51 females with 45 adults (60%).

Of the animals observed, age (Figure 1) was known for 60% of the animals. Calves and young (less than/ 10y old) formed 28.1% and 28.6% respectively of the female and male population (includes only those animals whose ages, adults and young, were known, i.e., total number of females= 32 and total number of males = 14).
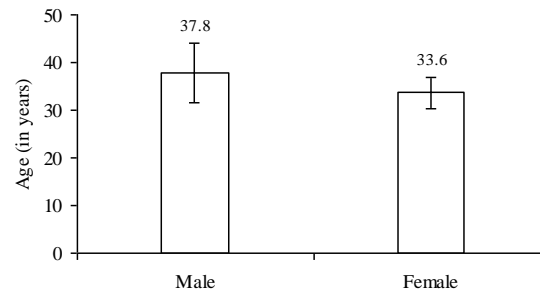
Figure 1: Mean age of elephants

Source of elephant
The change in living conditions experienced by a wild-caught elephant will be greater than that experienced by a captive born elephant. This may result in greater stress for the animal.
- Source was known for 63% of the elephants (N= 76), of which 25 were purchased and 23 were captive born
- Year of purchase free ranged from 1954 to 1995; Locations were Sonepur (Bihar), Assam and within Andaman
- Figure 2 shows the age of elephants at purchase, most elephants being in the free range of 16-20yrs; Figure 3 gives the average age at purchase based on sex of the elephant
- Among the captive born elephants, there were 9 males and 14 females. Figure 4 gives the number of known elephant deaths for a ten year period
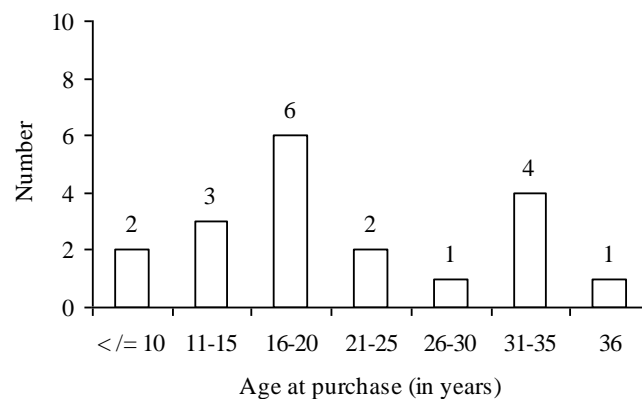
Figure 2: Age of elephants at purchase
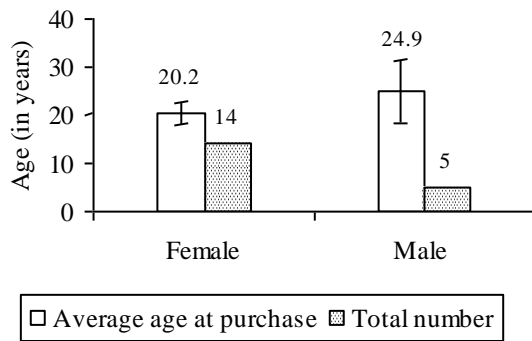
Figure 3: Mean age at purchase
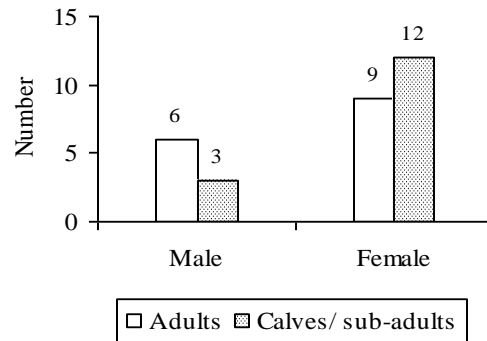
Figure 4: Elephant deaths from 1997-2007

Mahout change

The bond developed between handler and elephant may be broken if handlers are changed. New handlers involve a period of learning for elephants and handlers which maybe stressful, hence, frequent mahout change has been given low rating.

- Most mahout changes involved 2-3 handlers (43%, N= 53)
- Most common reason was retirement (16), followed by transfer (13). Total number of observations, N= 41.

M-R was 5.5 (SE= 0.4, N= 54) indicating a deviation of 31.4% from E-R.

Shelter

The physical space provided to captive elephants (Figure 5) maybe different from those experienced by wild elephants: absence of vegetation, occurrence of hard substrates maybe prevalent.

- All the elephants were maintained in a forest environment with varied vegetation and natural flooring
- Space available free ranged from 35, 80 ft^2 (for two elephants) to 5km radius.
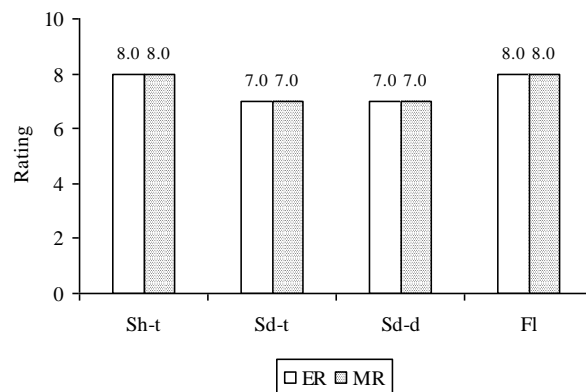
Sh-t: Shelter type   Sd-t: Shade type   Sd-d: Shade type-day   Fl: Flooring

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

M-R was 8.0 (SE= 0.0, N*= 4) implying no deviation from E-R.

Water availability
Suitable water sources not only provide clean water, free from contamination, but also opportunity to perform species-typical behaviours.
- Streams formed water sources for all observed elephants
- Distance free ranged from 20ft to 3km
- The elephants were said to drink water from once to 7 times/ day, most drank twice a day
- Bathing place was streams/ the sea
- Bath frequency free ranged from daily to weekly twice with fewer baths in summer
- Bath duration free ranged from 10 min to 1.5h, most common duration being less than half-hour (82%)
- Natural, locally available materials were used as scrub while bathing, with only few said to use plastic brushes
- No tests were done on quality of water

M-R was 5.2 (SE= 1.3, N*= 8) showing a deviation of 34.8% from E-R (Figures 6 and 7).
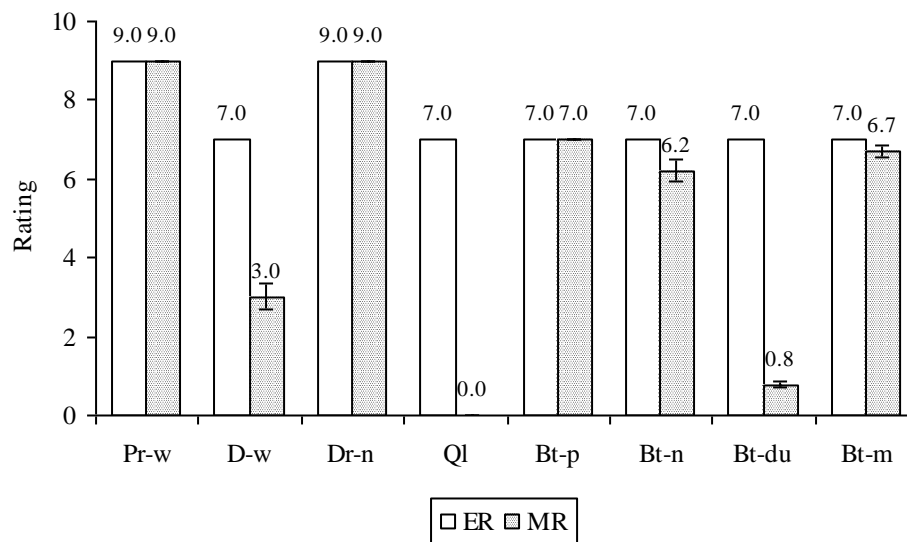
Figure 6: Comparison of E-R and M-R for 'water' sub-parameters
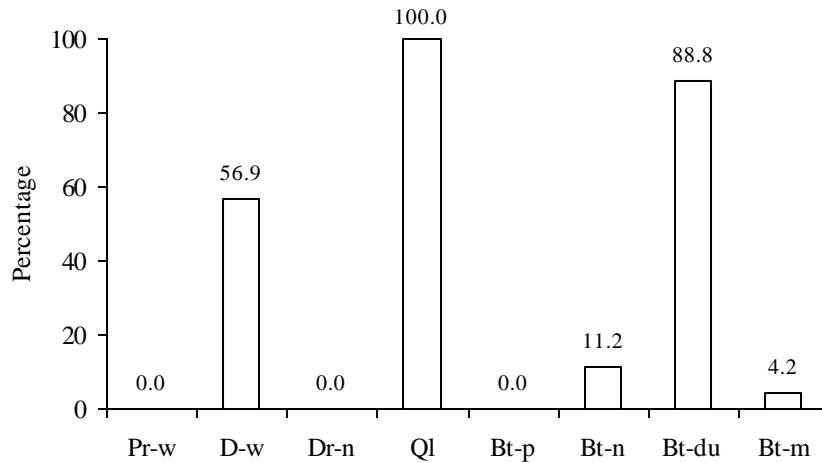
Pr-w: Availability of perennial running water source   D-w: Distance to water source
Dr-n: Number of times drinking water   Ql: Water quality tests   Bt-p: Bathing place
Bt-n: Number of times bathed   Bt-du: Bath duration   Bt-m: Bathing materials

Figure 7: percentage wise deviation from E-R for water sub-parameters

Sleeping place and duration

Unsuitable substrates may result in abrasion related injuries/ foot problems in elephants. Kurt and Garai (2007) state the duration of sleep for adult elephants to be 3-4h. Excess sleep maybe indicative of ill-health/ absence of suitable activities for the elephant to perform.

- 50% of the elephants were said to sleep for duration of 2-3h (N=20), duration free ranged from 1- 5h
- Forest was the sleeping place for all observed elephants

This parameter was rated considering two sub-parameters only: sleep duration and sleeping place (Table-1).

Table – 1: Comparisons of Expert and Mean Ratings for sleep and related parameters

Rating	Sleep duration	Sleeping place
E-R	8.0	8.0
M-R	5.6	8.0
SE	0.5	0.0
N	9.0	32.0
% deviation from E-R	30.6	0.0

Social interaction

Elephants are known to live in groups of related individuals, females remaining in their herd (Sukumar, 2006); males disperse gradually from their herds (Poole and Moss, 2008).
Social interaction that resembles social interaction in the wild has been given high rating.

- 32% of elephants were not provided opportunity to interact, age ranging from 10 – 64y (male/ female)

53

- 41% of elephants were allowed zero to less than one hour interaction while 54% were allowed for 18-24h duration
- Number of individuals free ranged from 0-3 with 1-2 individuals forming 51% of all the groups
- Most elephants were in close proximity (0-100ft.), with few being 100-200m from each other
- Groups comprised related/ unrelated individuals

M-R was 4.9 (SE= 1.1, N*= 4) showing a deviation of 38.4% from E-R (Figures 8 and 9).
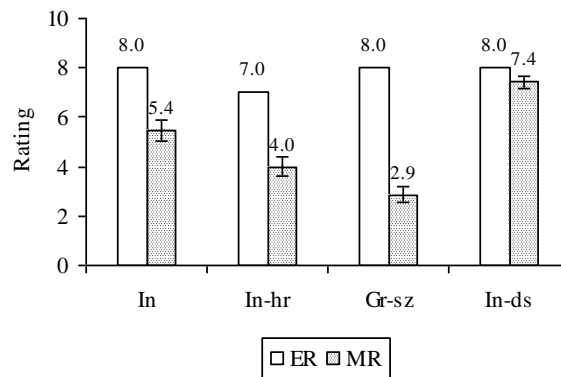
Figure 8: Comparison of E-R and M-R for 'interaction' sub-parameters
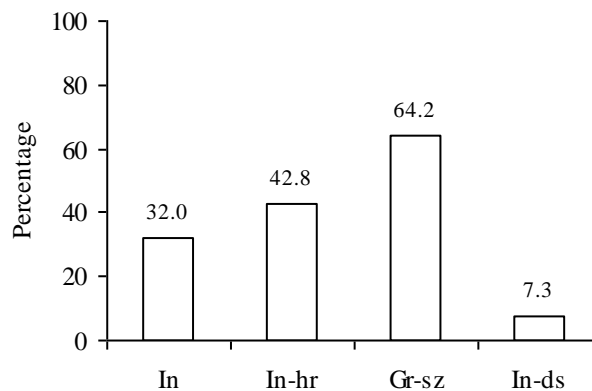
In: Opportunity for interaction   In-hr: Hours of interaction   Gr-sz: Group size
In-ds: Interaction distance

Figure 9: Percentage wise deviation from E-R for 'interaction' sub-parameters

Chaining
Captive elephants are subjected to various periods and types of chaining as a means of controlling them.

- Only five elephants (all, except one, being less than 10y, the single elephant's age was unknown) were not chained
- Plain chains were used
- 88% of elephants were chained in the leg region; *Bandhan*, Dragging, *Bedi*, Hook chains were used depending on work performed
- 85% of elephants were shackled by their forelegs
- 26% elephants (N= 61) were not allowed to free range at night; drag chain and/or *bedi* was used while ranging free
- All elephants of Makarti valley swam across to other islands (1-2 km) and returned, 4-5 times/ month; it is not known if drag chain was still attached when they swam

M-R was 2.5 (SE= 1.0, N*= 6) implying a deviation of 68.5% from E-R (Figures 10 and 11).
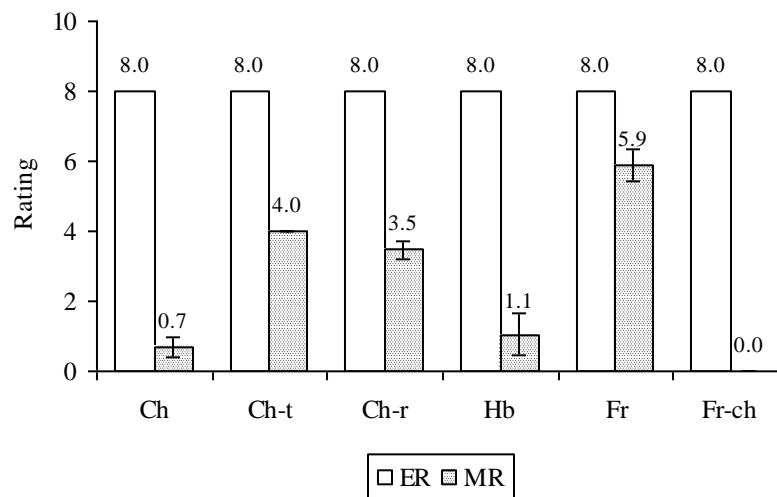
Figure 10: Comparison of E-R and M-R for 'chaining' sub-parameters
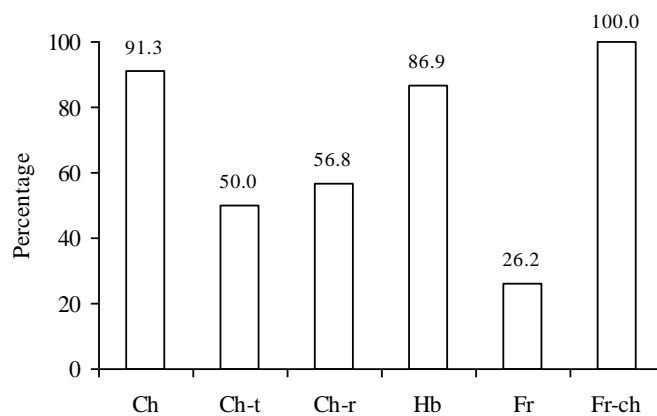
Ch: Chained/ free-ranging   Ch-t: Chain type   Ch-r: Chaining region
Hb: Hobbled/ not (Shackling) Fr: Opportunity to free range at night
Fr-ch: Chain type while free ranging

Figure 11: Percentage wise deviation from E-R for 'chaining' sub-parameters

Observed behaviour

The temperament of elephants can be indicative of the ease of managing the elephant. Occurrence of abnormal behaviours such as stereotypy has also been considered.

- 16% of elephants (N= 75) were described as agitated/ nervous/ undependable/easily frightened
- 21% were described as rough/ aggressive/ quiet but easily frightened/ nervous; remaining were described as quiet
- Only two females (age unknown) were said to have injured people; 15 males were reported to have injured/ killed people
- Except for a female calf, none of the elephants exhibited stereotypy

M-R was 6.8 (SE= 0.8, N*= 3) with a deviation of 14.5 from E-R (Figures 12 and 13).
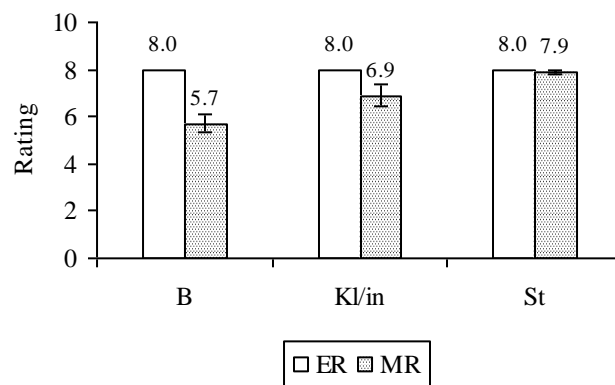
Figure 12: Comparison of E-R and M-R for 'behaviour' sub-parameters

Figure 13: percentage wise deviation from E-R for 'behaviour' sub-parameters
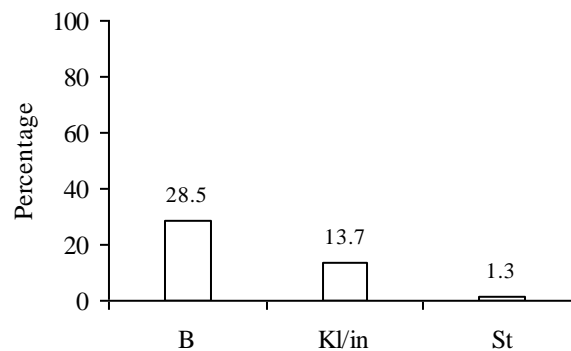
B: Observed behaviour Kl/in: Incidents of killing/injury   St: occurrence of stereotypy

Work

Work could be a reason for maintaining captive elephants. Work that is alien to an elephant's natural repertoire has been given low rating.

Work schedule for elephants when timber operations were banned:

- 68% of elephants were given any work (N=75); absence of work was due to the ban on logging in forests; some elephants had stopped working as recently as 2 months ago while others from 10y
- Work for the remaining elephants involved loading/ dragging, three adult female elephants were used for tourism
- For tourism: elephants used for providing rides, bamboo howdah weighing 30-40kgs was used, four people were carried per trip, number of trips depended on tourists (from 1 − 10 trips), distance/trip traveled was 0.5km
- Work duration free ranged from 1-5h, from 9 a.m. to 2 p.m. or in shifts from 8/9 a.m. to 12noon/1p.m.
- Forest shade and water was available while working, rest duration free ranged from 5-10minutes to 1h

M-R was 6.3 (SE= 1.0, N* = 7) showing a deviation of 21.5% from E-R (Figures 14 and 15).

Figure 14: Comparison of E-R and M-R for 'work' sub-parameters

Wk: work type   Wk-hr: Working hours   Sd: Shade availability
Sd-t: Shade type   W: Water availability
Rs: Rest availability   Fd: Food availability during work

Figure 15: percentage wise deviation from E-R for 'work' sub-parameters

Work schedule for elephants when timber operations resumed in 2009:

- Timber extraction is done from December to March
- Elephants aged more than 7y were used for work; only 24% of the observed elephants (N= 62) were not used for work
- Work type was timber extraction: elephants were used for dragging and loading onto trucks, especially tuskers were used for loading; logs are dragged by using chains fixed to a breast band (Galabandh)
- 7-15y elephants were used for light dragging for 5 days/week; > 15y old elephants performed normal work such as dragging logs of volume $3.5m^3$ to $12.5m^3$/ day; elephants could perform such work for a 30y period before becoming sluggish (Verghese, pers.obs.).
- Elephants retired from work when they were 60y
- When elephants are in their 13th month of pregnancy, work load reduced to half, after calf-birth no work for six months, stall feed is given; calves weaned when they are 3y, trained till they 7 and sent for work

Daily schedule was as follows:
- Elephants brought back from grazing early in the morning
- taken for watering/ bathing
- taken to work, work duration 7h/ day
- after work, cooked ration was given
- left to graze

M-R was 5.3 (SE= 1.3, N*= 7) with a deviation of 34% from E-R (Figures 16 and 17).
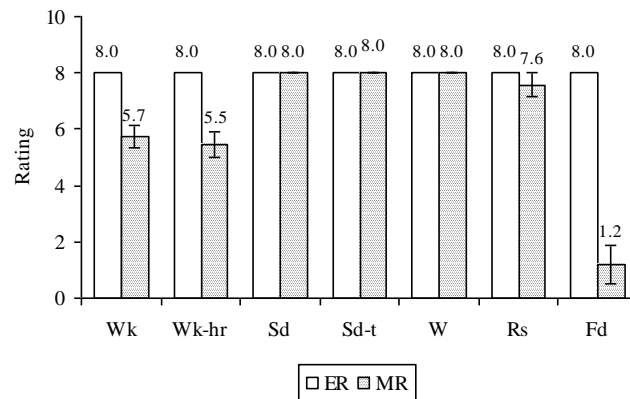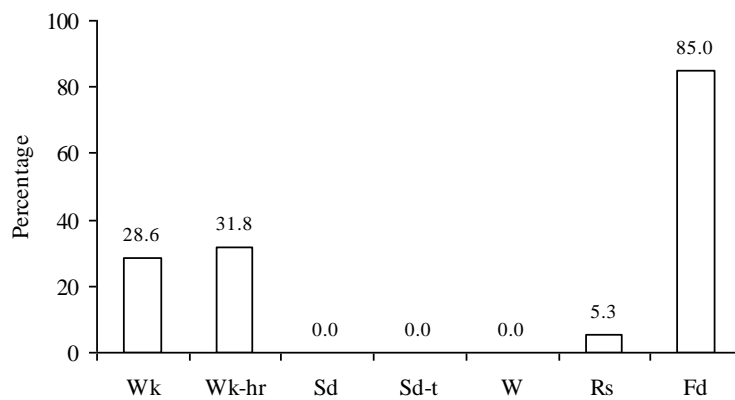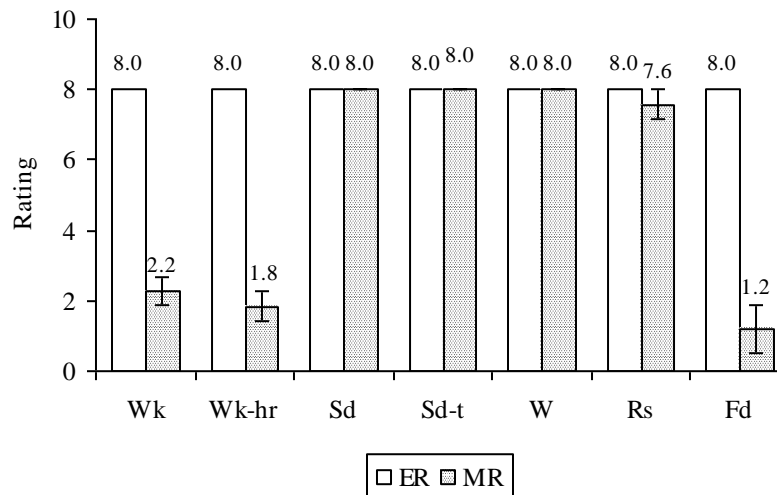

Figure 16: Comparison of E-R and M-R for 'work' sub-parameters
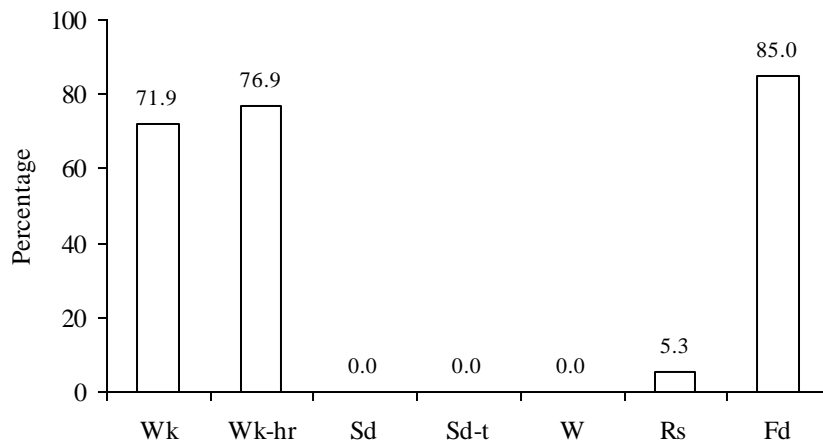
Wk: work type Wk-hr: Working hours Sd: Shade availability
Sd-t: Shade type   W: Water availability
Rs: Rest availability   Fd: Food availability during work

Figure 17: percentage wise deviation from E-R for work sub-parameters

Food provisioning
Wild elephants are known to eat diverse plants, learning from others in the herd (Kurt and Garai, 2007). In captivity, this may not be completely represented as the elephants are allowed to free range for limited duration/ are restricted by chains.

- Three elephants, one calf, a 64yrs and a 59yrs old, were not allowed to free range. The calf was given stall feed, while the old elephants were tied to a place in the forest and allowed to forage
- 58% of the elephants (N= 62) were reported to have raided crops; crops eaten were: paddy (*Oryza sativa*), coconut (*Cocos nucifera*), banana (*Musa* sp.), bamboo (*Bambusa* sp.), and sugarcane (*Saccharum* sp.)
- Ration charts were not used for any of the observed elephants

Rating and status and the percentage deviation from E-R for food is given in Figures 18 and 19
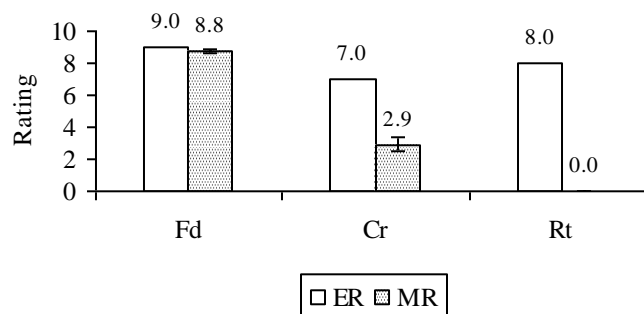
Figure 18: Comparison of E-R and M-R for 'food' sub-parameters
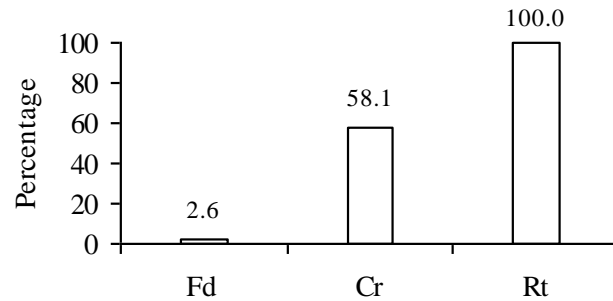
Fd: Food provisioning type   Fd-n: Number of supplementary food items
Cr: Crop raiding   Rt: Usage of ration chart

Figure 19: percentage wise deviation from E-R for 'food' sub-parameters

Reproductive status

Normal reproductive functioning among adult captive elephants can be considered to be an indicator of normal physical health/ and/or good welfare status (Clubb and Mason, 2002) with provision for expression of some/ all species-specific behaviours in this context.

- Among the male elephants which were reproductively active/ exhibited musth (N=21), 48% were not exposed to females or exposure was not constant, taking place several years ago
- Males were said to be aggressive during musth (aggressiveness said to be less than that observed for mainland elephants) (per. obs., Verghese)
- Elephants in musth were chained for the period with one adult male reportedly chained for 8 months
- Among female elephants, 30% (N= 30) were not exposed to males.
- Sixteen offspring had died from various causes (abortion/ premature birth/ illness/ man-made)
- Three females were not bred as they showed aversive reaction to the presence of males

Figures 20-23 give the respective ratings and percent deviation for male and female reproductive status.
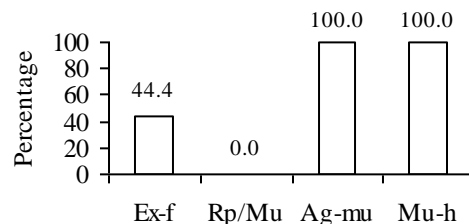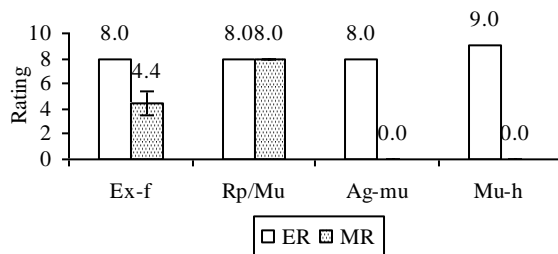
Figure 20: Comparison of E-R and M-R for males   Figure 21: Percentage wise deviation from E-R for males
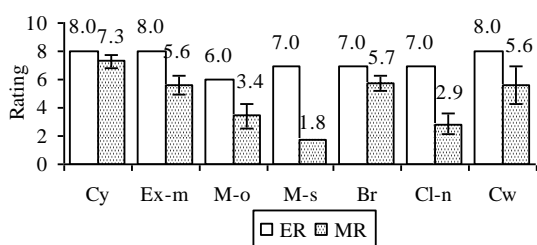
Figure 22: Comparison of E-R and M-R
for female
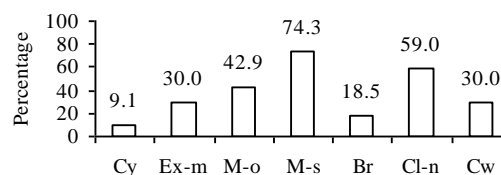
Figure 23: percentage wise
deviation from for females

Health status and veterinary care

Captivity may introduce a number of factors predisposing elephants to diseases/ injuries.

- Abscesses on neck/ shoulder, uro-genital problems, diarrhea, respiratory problems was reported among the elephants
- Eleven elephants had eye associated problems with five said to be blind in one eye at least
- Foot problems such as foot rot/ fissures/ toe nail cracks was reported for eleven elephants with two elephants having fractured their legs
- One female elephant was said to be weak, with pus collected in its back; it was used for work
- Oiling was not done for majority of the elephants; deworming was practiced for the observed elephants
- Veterinary doctor was available for all observed elephants, assistant was available in some camps
- Facilities: dispensary with medicines and darting equipment available in each Free range office; no accommodation, no cooking shed/ vessels, no food preparation hall, no provision shed, camp site available

M-R was 5.8 (SE= 2.2, N*= 4) showing a deviation of 28% from E-R (Figures 24 and 25).
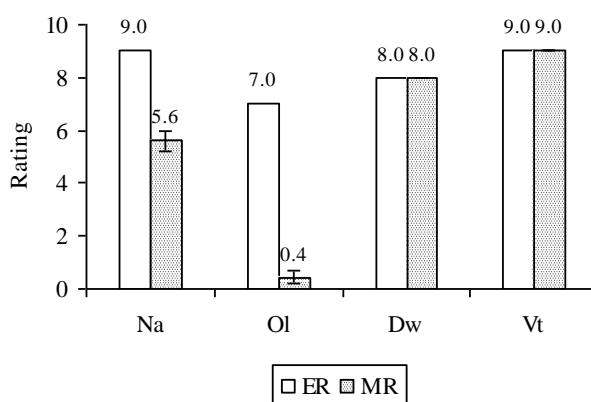
Figure 24: Comparison of E-R and M-R for 'health and veterinary'
sub-parameters
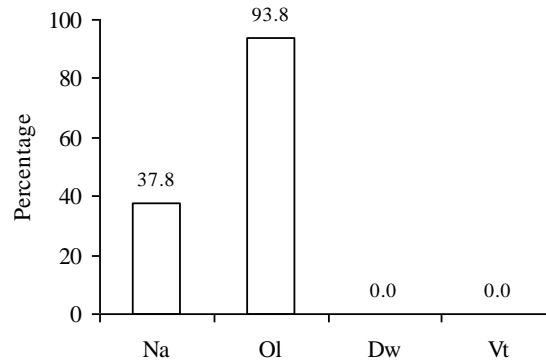
Na: Nature of disease/injury   Ol: Oiling status   Dw: Deworming status
Vt: Veterinary doctor availability

Figure 25: percentage wise deviation from E-R for 'health and veterinary' sub-parameters

Handler experience and socio-economic status

Seventy-six elephants observed in these islands were handled by 94 mahouts/ cawadis, the ratio was 1:1.2. Six mahouts took care of more than one elephant with one mahout in charge of the maximum (for this study) of three elephants. Mean age was 42.0 yrs (SE= 1.0, N= 91), ranging from 24-60 yrs.

Professional experience

Lack of knowledge about elephants/ inexperience can prove to be dangerous to both elephant and handler.

- Mean experience in this profession was 15.4y (SE= 0.9, N= 82), experience with a specific elephant was 9.1y (SE= 0.8, N= 85) ranging from 0-34y
- Only 13.2% of handlers opted for this profession out of interest, only two mentioned this profession to be traditional, most chose it as a means of employment
- Handlers spent 2-8h with their elephants (average= 5.1h, mode = 5)
- All used tools to control their elephant: Knife/wooden ankush/Stick

M-R was 4.5 (SE= 1.2, N*= 4) showing a deviation of 49.6% from E-R (Figures 26 and 27).
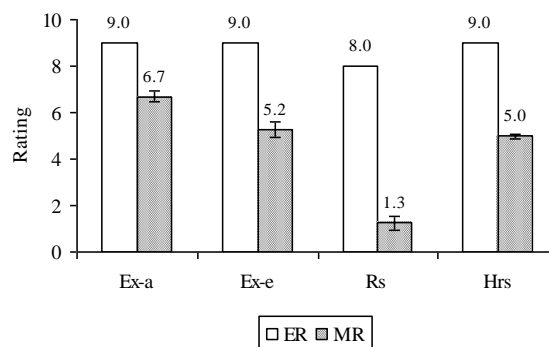
Figure 26: Comparison of E-R and M-R for mahout (handler) professional experience

62
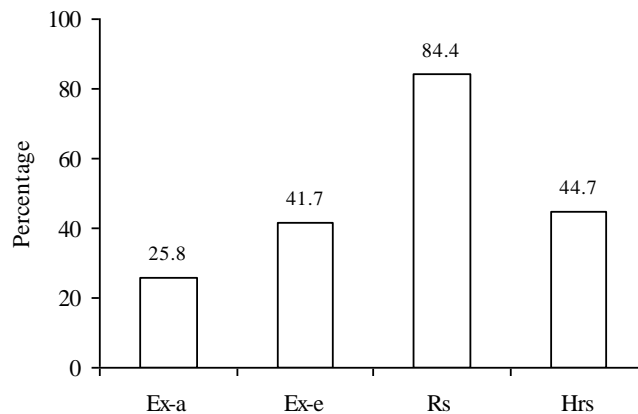
Ex-a: Professional experience (as % of handler age) Ex-e: Professional experience (as % of elephant age)
Rs: Reason for choosing this profession   Hrs: Hours spent with elephant

Figure 27: Percentage wise deviation from E-R for mahout (handler) professional experience

Socio-economic status

Inadequate remuneration, absence of education and consumption of alcohol may reduce the quality of work performed by the mahout. When family occupation is handling elephants, it becomes easier for the mahouts/ cawadis to communicate and understand existing work related issues.

- 75% of handlers did not have relatives in this profession, none came from a background of handling elephants; agriculture was the most common family occupation
- Twenty-eight percent of mahous/ cawadis were not educated
- Average annual salary was Rs. 73911/- (N= 70) ranging from Rs. 13,000 to 1,08,000/-
- Except for two handlers, each handler knew a minimum of two languages
- Number of children per family free ranged from 1 – 9 (with the most common being three children/ family)
- There was no periodic health check-up for the handlers
- 45% of handlers were not provided insurance cover; for the handlers with insurance cover, they paid the insurance amount from their salary
- Only 12% handlers abstained from alcohol; those who consumed alcohol, the frequency free ranged from daily, weekly or monthly, after work

M-R was 3.5 (SE= 0.8, N*= 8) indicating a deviation of 49.7% from E-R (Figures 28 and 29).
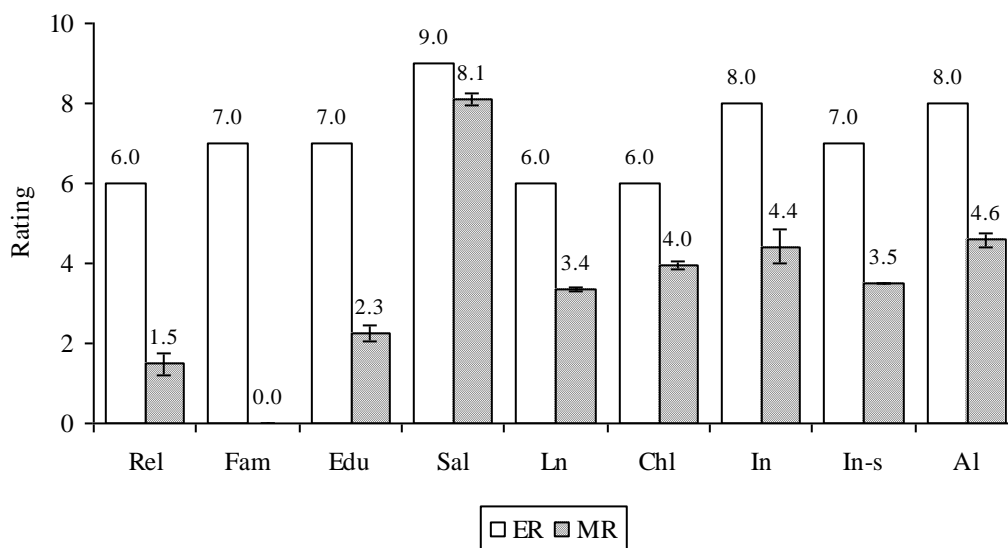
Figure 28: Comparison of E-R and M-R for mahout (handler) socio-economic status
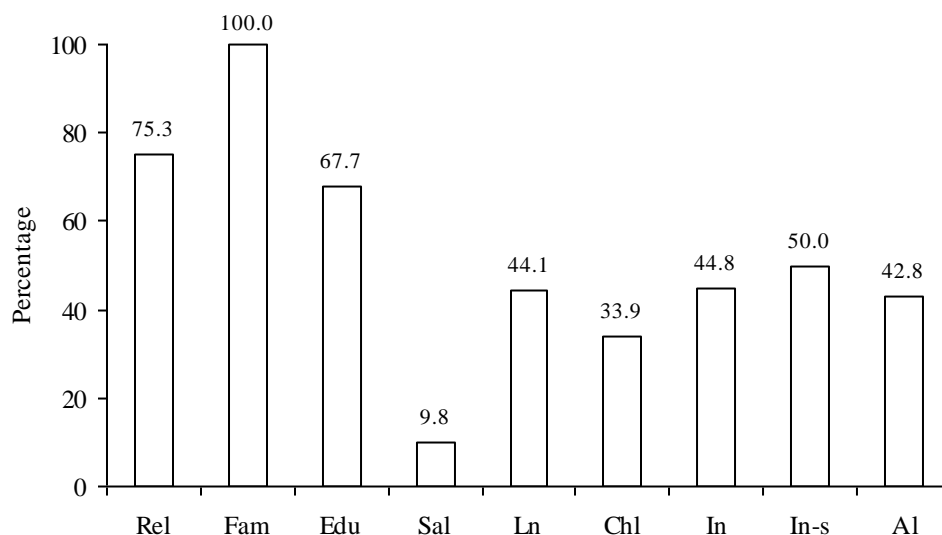
Rel: Having mahout/cawadi relatives   Fam: Family occupationEdu: Education level
Sal: Salary drawn   Ln: Languages known   Chl: Number of children
In: Insurance availability   In-s: Source of insurance   Al: Alcohol consumption

Figure 29: percentage wise deviation from E-R for mahout (handler) socio-economic status

Overall rating

Overall M-R, averaged across all observed parameters, was 5.1 (SE= 0.4, N*= 54) showing a deviation of 36.8% from E-R, this rating is for the period in 2007 when timber operations were banned in the islands.

When work for the elephants resumed in 2009, following timber extraction, overall M-R was 4.9 showing a deviation of 38.4% from E-R. Thus, the deviation from the norm, prescribed by the experts, was slightly higher when work resumed in 2009. This deviation was only due to the work performed. Other features of captivity remained the same contributing to lesser deviation from prescribed norms even when the elephants were worked, leading to similar pattern of deviation from E-R for both years (Figures 30 and 31).
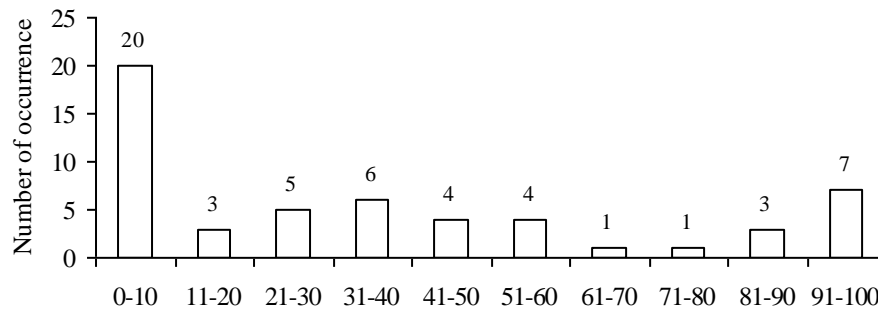
Figure 30: Distribution of percentage wise deviation (from E-R) values across all sub-parameters in 2007
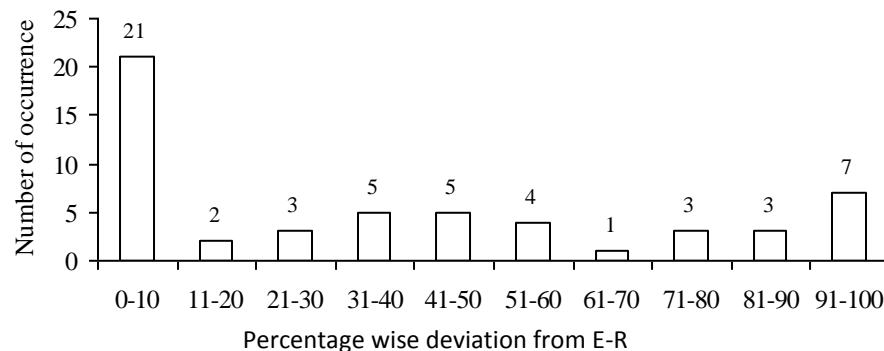
Figure 31: Distribution of percentage wise deviation (from E-R) values across all sub-parameters in 2009

Mean ratings for a parameter varied from being similar to what the experts considered ideal to showing complete divergence (100%) from E-R. Nearly 32% of the parameters (total number of parameters was 54) showed a divergence of 50% or more from E-R, spread across observed parameters, implying absence to the extent of 50% or more from what the experts considered suitable.

Discussion

Imposing alien living conditions, physical/ social, will have negative consequences on the captive animal's life as it tries to cope with the new environment. In addition, captive elephants' lives will be predominantly controlled by people (Bradshaw, 2009), a factor that may─ depending on the extent and degree of change brought in by people─ add to the stress and consequent poor welfare of the animal/s.

Positive features
Physical conditions in the camps:

- Prevalence of ideal/ suitable shelter conditions in the form of forests with varied vegetation and natural substrate— taking care of physical space and shade requirements of the animals; zero deviation from E-R was observed
- Occurrence of streams within the forests as water source; access to sea; no deviation from E-R for this sub-parameter

Biological features:
- Absence of stereotypy in most of the observed elephants; zero deviation from E-R

Administrative feature:
- Provision of free-ranging opportunity to forage: foraging opportunity, though restricted, was provided for 96% of the observed elephants (N= 76); deviation of 3% from E-R was observed for this sub-parameter
- Old elephants maintained as "pensioners" and not given any work
- Availability of veterinary doctors for the elephants; no deviation from E-R

Negative features of the camps:
- The predominant reason for introduction of elephants into the islands was use in timber related work as trees were harvested from the forests. In 2007, sixty-eight percent of the observed elephants were not given any work. The consequence of absence of work for the elephants was lack of food supplements through stall feed. Foraging opportunity was restricted by two means: it was not unrestricted, i.e., the elephants were left to forage towards the afternoon and brought back in the morning. Secondly, their movement was restricted by the use of shackles for the forelegs, drag chains, *bedi*. A significant fact was that 58% of the observed elephants had visited crop fields in search of food.

In 2009, 76% of the elephants were used for work. Elephants were weaned when only three years old to be put to training, 7y old elephants were given "light work". At this age, male/ female elephants are still dependent on their herd-mates and are in the process of learning social skills (Poole and Moss, 2008). Separating them from their companions can be stressful, in this situation the elephants had to undergo training.

- Some of the older elephants (above 55y) were tied within the forest and left to forage, thus, restricting their ability to choose food plants. Additionally such elephants may need supplements following loss of dentition as a consequence of old age (one male elephant was reported to be 90y old). This was not provided. A deviation of 63% from E-R was noticed for this parameter.
- The selection of elephants for work: three elephants, all above 55y, were used for work.

A female elephant with pus on its back, and emaciated, was also said to be used for loading work.
- Social interaction was allowed among some of the elephants; however, the group size was restricted to a maximum of only three individuals. Interaction was not allowed for 33% of the elephants, this included 57% of the older elephants (number of elephants above 55y was seven), all females. It is known from observations of wild elephants, that elephant society is matriarchal with the oldest female leading the herd (Sukumar, 2006). The absence of elephant

companions for the old female elephants in the island reduces the welfare status of such animals. A deviation of 38.4% from E-R was observed for this parameter.

- While adult males were reported to be reproductively active, exposure to females was not universal as 48% of such males were not allowed an opportunity. Also, all musth elephants were chained for the duration of their musth. Deviation from E-R was 61% for this parameter. \

- Opportunity to breed was prevalent for most female elephants, mothers with zero to 50% survival of offspring formed 67% of the elephants. Reasons for death varied/ were not known. But, among the abnormal behaviours noticed was the killing of its offspring by a female. Among other reasons, those cited were: "punishment of a male offspring by starvation/ no water, hence, died; a male died due to illness; a male tied to a tree, unattended for 2 days, died." While this needs to corroborated/ investigated, it could point to absence of supervision of the handler-elephant relationship.

Mahout/cawadi
While mean experience in the profession was >10y, mean experience with the observed elephant was only 9y indicating shift/ change of elephant. Frequent changes may cause stress to both elephant and handler as each may have to undergo a learning period. Maintaining elephants in the islands may date back several hundred years, but the reason for choosing this profession among the observed mahouts was only as a source of employment. This may point to lack of interest in this profession among the established handlers and their progeny. A deviation of 50% from E-R was observed for professional experience.

The distance from chaining place of the elephants to the mahout/cawadi's place varied: from less than a kilometer to 40kms. Some places were accessible by boat only. Such isolation may not be conducive for the handlers to involve themselves with the job of elephant care. The salary paid to the handlers was considered suitable but there was no insurance cover for 75% of the mahouts/ cawadis. Even for handlers with insurance the source was their salary, a practice that may not prove to be an incentive to opt for coverage.

Eighty-eight percent handlers consumed alcohol with varying regularity. This practice may be indicative of a latent problem for the handlers. The deviation from E-R for socio-economic status was 50%.

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Section 3:
Captive Elephants in Forest Camps of Assam

Executive Summary

The uses of elephants in logging operations no longer being valid, captive elephants owned and maintained by the forest department have been sourced for patrolling forests and tourism related work.

The management of elephants and their handlers (mahouts/ghansis) in these forest camps (FCs) in Assam was studied in order to assess the welfare status of elephants in terms of the living conditions provided. To also know the professional experience and socio-economic status of handlers— both these features are important not only for the handler's welfare, but also in the way the elephants are cared for.

Data was collected through observation of animal/s and interviews with personnel/management, representing various aspects of the elephant's life in captivity. The data was grouped under different parameters based on physical/social/managerial/ physiological relevance to the animals. A team of experts rated different parameters important to the welfare of captive elephants and this rating was then used to assess the welfare status of elephants and their handlers.

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

Data on a total of 78 elephants of forest camps across several districts of Assam is available. Mean age, across all elephants was 22 years ranging from 0.4 – 65 years. Female age ranged from 1-62 years while males ranged from 0.4-65 years.

Fifty nine percent of elephants were captive born, 27% captured from the wild, 11% rescued and 4% said to be purchased/transferred. All the FC elephants were kept in forest environment and used for such activities as patrolling/ tourism related work. The M-R was 5 indicating a deviation of 33% from E-R.

All except two elephants had access to nearby forests; the two elephants not left in the forest were both rescued, one female (1.5 years) and one male (4 months) were housed in shelters with concrete floors and tin roof. Overall M-R for this parameter was 7 showing a deviation of 17% from E-R.

The elephants had access to several sources of water: river, stream, lake, pond and taps, used for drinking/ bathing. The elephants were bathed between 1-2 times per day. Bathing duration was between 1.0 -1.25 hrs, bathing materials used were *Shau* or dry grass, *Jhak* & hay or just hay. M-R was 5.0 with a deviation of 37% from E-R.

All elephants, except three, were allowed to interact, two calves (both rescued) and a 25y old male were not provided opportunity to interact. M-R was 7, implying a deviation of 11% from E-

R. Except for two rescued calves (male and female), the elephants were allowed to free range, even during night with drag chain/ hobble. M-R was 3 with a deviation of 64% from E-R.

Ninety percent of the elephants were reliable/ quiet, 7% were said to be undependable/ aggressive (all male, adults) and a 4y old female as easily frightened, one elephant was described as being aggressive during musth and one a little agitated. Only two elephants exhibited stereotypic movements: vertical shaking of head/ swaying of body when chained. M-R for temperament of the observed elephant was 7 with a deviation of 9% from E-R. M-R for stereotypic behaviour was 7.5 showing a deviation of 6% from E-R.

Seventeen percent of the elephants were not given any work. For others, the work type was patrolling, safari rides for tourists. Howdah used while carrying people, howdah made of *gaddi* / *gaddela.* M-R was 5 implying a deviation of 38% from E-R.

Except the two rescued calves, all elephants had access to both free-range foraging and stall feed. Stall feed was: Banyan stem (*Ficus* sp.), Bamboo (*Bambusa* sp.) leaves, pulses, boiled paddy (*Oryza* sp.), and commercial cattle mineral mixture. M-R was 7 showing a deviation of 15% from E-R.

The adult females were in oestrus cycles, exposed to males, breeding opportunity was provided, had been observed to mate, male source was both wild and captive bull, calf birth was reported with cows present during birth. Three adult males were reported to be reproductively active; musth reported for four males. M-R for female reproductive status was 6.9 implying a deviation of 2% from E-R.

Occurrence of diarrhea/ worm infestation, uro-genital infection, toe nail cracks, pododermatitis and abscesses was reported. Foot injuries/ problems were reported for seven elephants. M-R was 5 with a deviation of 22% from E-R. All the elephants had access to a veterinary doctor with experience in treating elephants. Experience with elephants was 3-4 years. Doctor's visits were weekly/fortnightly. M-R was 6 with a deviation of 27% from E-R.

Mean age of handlers was 40 years ranging from 27- 53y. Experience in this profession ranged from 6-30 years and experience with a specific camp elephant ranged from 1-22 years. M-R was 5 showing a deviation of 47% from E-R.

Sixty eight percent of handlers belonged to the tribal/ Muslim community. Mean annual salary drawn was Rs.91217/- ranging from Rs.72000-96000/-. None of the handlers had any insurance cover and 57% of handlers consumed alcohol, with most said to drink after work. M-R was 3 indicating a deviation of 53% from E-R.

The overall welfare assessed by the percentage of deviation from the Expert Rating suggests that the amount of occurrence of no deviation from E-R and those that deviate by 50% or more are nearly equal (for deviations >/= 50%).

Introduction
Elephants maintained by the Government, in the North-East regions, have a long history dating back to the British period (Sanderson, 1879), implying a well-established system for the care of

captive elephants. The use of elephants in logging operations no longer being valid, captive elephants owned and maintained by the forest department have been sourced for tourism related work. The region's terrain and rich bio-diversity makes it imperative for effective monitoring against depredation; an effective means has been the use of tame elephants for patrolling.

Objective
Captivity brings with it the factor of human influence, controlling all aspects of the captive animal's life. This may result in altered living conditions for elephants with concomitant variation in the suitability of such conditions for the elephants. The management of elephants and their handlers (mahouts/ ghansis) in these forest camps (FCs) needs to be studied in order to:
- Assess the welfare status of elephants in terms of the living conditions provided— physical, social and psychological features as well as health care facilities available; effects on welfare in terms of normal occurrence/ absence of reproductive functions in adult animals
- Professional experience and socio-economic status of handlers— both these features are important not only for the handler's welfare, but also in the way the elephants are cared for

Method
Wild animals live and survive in habitats through an intricate network of interactions between animals and the physical environment. The essential feature is the control exercised by the animals themselves in the way they eat, sleep, socialize/ reproduce. This is replaced by human presence in captivity. Elephants cannot be considered to be domestic (Lair, 1997; Kurt, 2007), they are wild animals living in captivity. The differences experienced in the day-to-day physical/ social activities by captive animals in relation to their wild counterparts may have an effect on the animal's biology and behaviour (Bradshaw, 2007) in the form of increased incidence of foot ailments, occurrence of stereotypy, heightened aggression, abnormal/ absent reproductive behaviour, shortened life-span.

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 wild conditions 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. Data was collected through observations of elephants/ interview of relevant personnel.

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

- The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter. For example mean expert rating of 8.0 (SE= 0.5, N=29) for a parameter 'floor' and 9.0 (SE=0.4, N=31) for 'source of water' was arrived at from the ratings suggested by each expert by averaging across all the experts' values.
- A mean rating for each parameter, across all the participating experts, has been used as the Experts' Rating (E-R) which represents the importance attached to a parameter i.e., for a parameter with 8.0 as the maximum value, only 2.0 (25%) deviation and parameter with maximum value 9.0, only 1.0 or 10% from the prescribed norm is considered acceptable.
- For example, if an elephant is exposed only to natural flooring, the animal receives a rating of 8 and for entirely unnatural flooring the value is 0; if animal is exposed to both natural and unnatural flooring, the value is 4 (as 8+0/2= 8/2= 4). If an elephant is exposed to a natural water source, such as a river, it receives a value of 9; if the source of water is large lakes or reservoirs, it gets 4.5. A value of 2.25 is assigned for small water bodies like tanks and ponds. Tap water (running) gets 1.125 and if only buckets, pots, and tankers are in use, then the allocated value is 0.5. This rating is then averaged across all individuals in that institution to get a Mean Rating (M-R) for that feature. Thus M-R represents the actual situation existing for the elephant/s.
- Therefore, using the maxima given by experts as a base, a rating scale starting from zero to the particular maximum value for that parameter has been used and the data for each animal was collected, in a given regime (for example, forest camp or temple).
- In this investigation, variables which represent a common feature of the captive situation have been grouped to form a parameter. The variables have been termed sub-parameters. For example, the variables shelter type, shelter size, floor type in the shelter; all represent different aspects of the physical space provided to the elephant. Hence, they are grouped together to form the parameter "Shelter" and each constituent variable is a sub-parameter. In this investigation, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters. The Mean Rating (M-R) for a parameter is the mean of M-Rs across related sub-parameters and denotes welfare status of existing conditions on the ground for the particular parameter.
- The number of such related parameters (sub-parameters) varies for each regime.
- Results have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the parameters observed. The difference between E-R and M-R (expressed as percent) indicates deviations from the prescribed norm.
- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) have been used to indicate the professional/ socio-economic status, of value to the handler and his elephant.
- N* refers to number of sub-parameters observed. N refers to number of individuals

Result
Population Status
Forest camps across several districts of Assam were surveyed; data on a total of 78 elephants was collected. Mean age, across all elephants was 22.2yrs (SE= 1.9, N=78) ranging from 0.4 − 65yrs. Female age ranged from 1-62yrs (N= 48) while males ranged from 0.4-65y (N= 31).
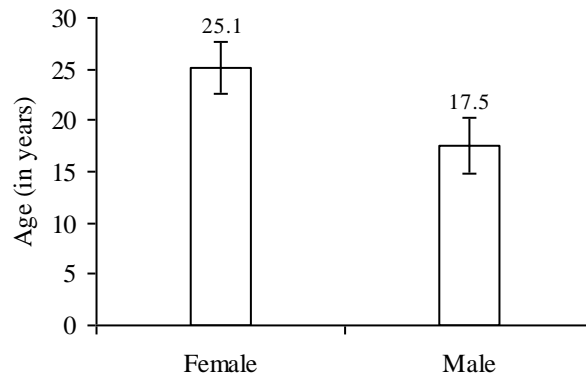
Figure 1: Age-sex distribution of elephants in FCs

Source of elephants

Elephants born in captivity may undergo lesser changes in their living conditions as compared to those that are wild-caught. High rating is assigned to indicate this situation, with elephants being shifted across owners through purchase/ exchange assigned lower ratings to imply stress resulting from exposure to different management regimes.

- Fifty nine percentages of elephants were captive born, 27% captured from the wild, 11% rescued and 4% said to be purchased/ transferred (N= 75)
- Sex ratio for captive born elephants was 1:1.8 (M:F, N= 44), Figure 2 gives the year-wise distribution of births
- Wild caught elephants were represented nearly equally, with 11 females and 9 males; Figure 3 gives approximate age at capture for both sexes, with mean age being 6.1y (SE= 0.6, N= 11) considering both sexes together; year of capture recorded from 1948 to 2004 but 73% of elephants' age recorded from 1980-2004
- Age at rescue was around 1 month (for the elephants for which data was available) of which five were males and three females
- Of the elephants purchased/ transferred, all were females

*: Year when data was collected
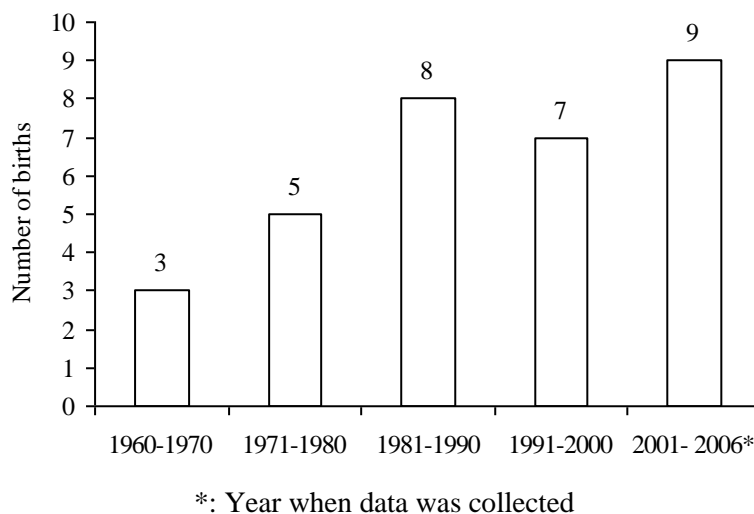
Figure 2: Year-wise distribution of births in FCs

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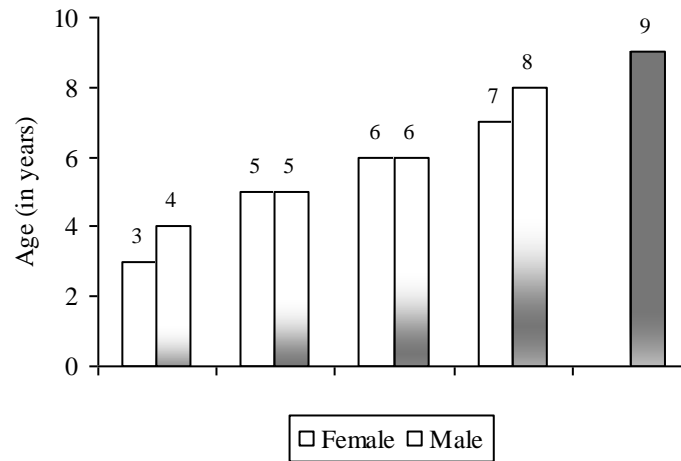
Figure 3: Approximate age at capture for wild-caught FC elephants

M-R for this parameter was 3.9 (SE= 0.3, N= 75) implying a deviation of 35% from E-R.

Purpose of keeping
Keeping elephants in their natural environment with commercial interest not being the primary objective may provide a degree of near-wild conditions. All the FC elephants were kept in forest environment and used for such activities as patrolling/ tourism related work. Hence, M-R was 5.3 (SE= 0.1, N= 25) indicating a deviation of 33% from E-R.

Mahout changes/elephant
Frequent change of handlers maybe a source of stress for the elephant and handler as each has to undergo a period of learning. Each of the observed elephants had undergone a mean number of three mahout changes. Figure 4 shows the relation between mahout change and age of elephants indicating increasing change of handlers as elephant's age increased. Figure 5 shows overlap in the mean number of mahouts changed/ elephant, considering sex of the elephant.
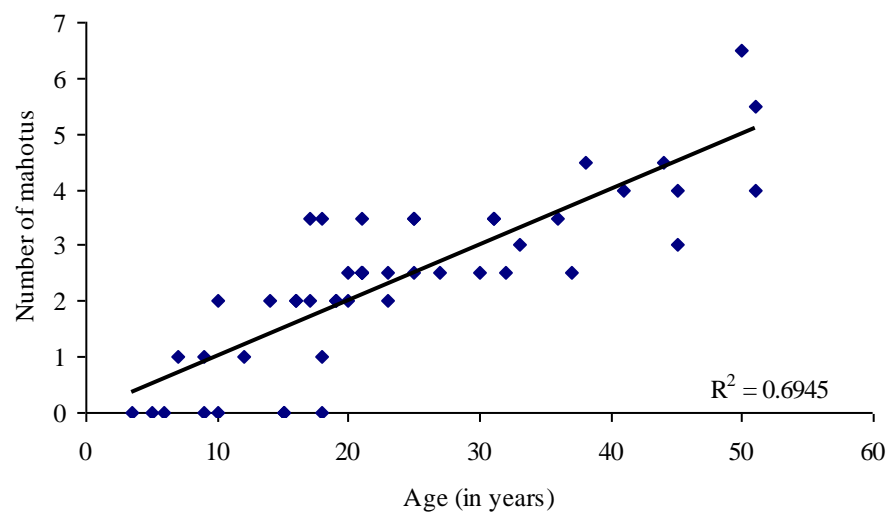
Figure 4: Association between mahout change and age of elephant
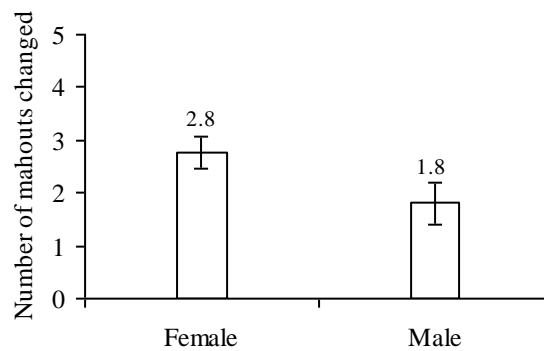
Figure 5: Mean number of mahouts changed based on sex of elephant

M-R was3.2 (SE= 0.4, N= 51) showing a deviation of 60.3% from E-R.

Shelter
Physical space provided to elephants in captivity may range from confinement in a restricted area to access to near-natural conditions.

- All except two elephants had access to nearby forests; the two elephants not left in forest were both rescued, one female (1.5y) and one male (4 months) were housed in shelters with concrete floors and tin roof
- Elephants were either left to wander in nearby forests/ tied in the open in the camp site/ *Pilkhana*, all except two had access to earthen flooring
- Shade available was through the trees in the camp site/ forest
- *Pilkhana*/ campsite was cleaned once daily, with the shelter for the rescued male calf said to be cleaned 2-3 times

Overall M-R for this parameter was 6.7 (SE= 1.1, N*= 5) showing a deviation of 17% from E-R (Figures 6a and 6b).
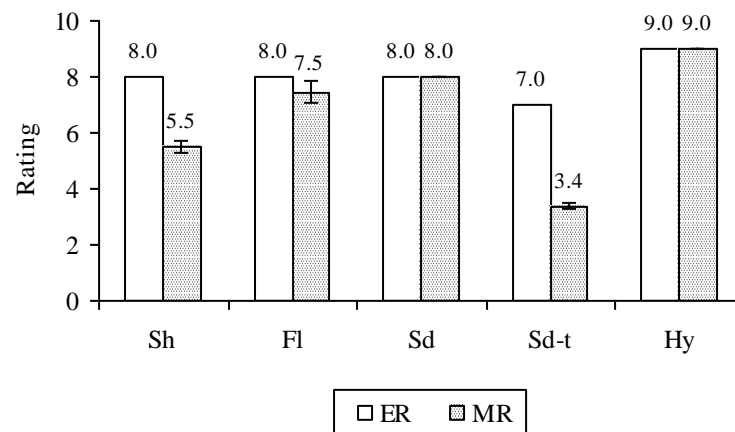
Figure 6a: Comparison of E-R and M-R for 'shelter' sub-parameters
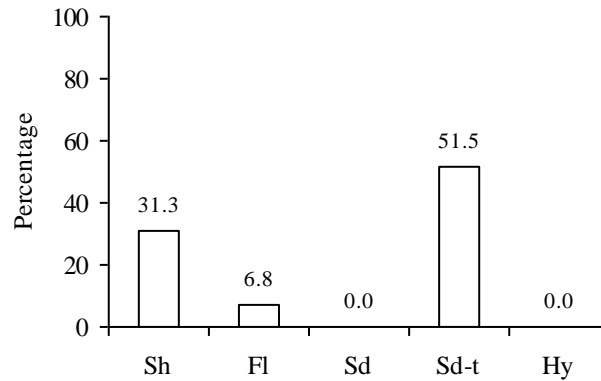
Sh: Shelter type Fl: Flooring   Sd: Shade availability   Sd-t: Shade type
Hy: Hygiene maintenance

Figure 6b: Percentage wise deviation from E-R for shelter sub-parameters

Water
Provision of water when the elephant needs it, along with availability of space for performance of species-typical activities has been considered. The practice of testing for the quality of water provided has also been included for rating.

- The elephants had access to several sources of water: river, stream, lake, pond and taps, used for drinking/ bathing
- 42% had access to rivers/ streams, 33% to a combination of ponds, lakes and rivers
- 93% of elephants were reported to drink water 3-4 times
- The elephants were bathed between 1-2 times per day
- Bathing duration was between 1.0-1.25hr, bathing materials used were *Shau* or dry grass, *Jhak* & hay or just hay
- Water testing for quality was not practiced in any of the FCs

M-R was 5.0 (SE= 1.3, N*= 7) with a deviation of 37% from E-R (Figures 7a and 7b).
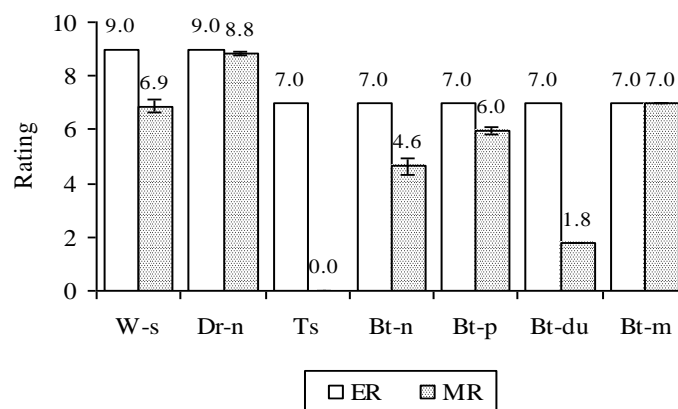
Figure 7a: Comparison of E-R and M-R for 'water' sub-parameters
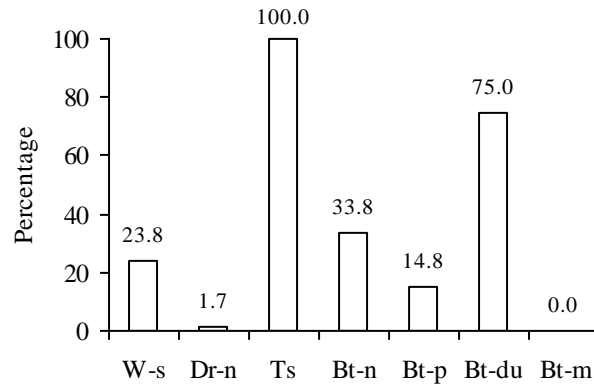
W-s: Availability of perennial source of running water   Dr-n: Number of times drinking water
Ts: Water quality tests Bt-n: Bating number of times   Bt-p: Bathing place Bt-du: Bath duration
Bt-m: Bathing materials

Figure 7b: Percentage wise deviation from E-R for 'water' sub-parameters

Sleep

Wild elephants have been observed to sleep between 3-4hrs at night (Kurt and Garai, 2007), this aspect is important for captive elephants in terms of their altered activity patterns. The sleeping place- whether in natural forest environs or in man-made structures, absence of suitable space through confinement may have consequences on the health and psychological state

- Except for the two young rescued calves, the elephants were tethered in the *Pilkhana* (in the open) or the camp site or were left free in nearby forests
- The calves were kept in their shelter
- Sleep duration ranged from 1- 6hrs

M-R was 3.4 (SE= 0.7, N*= 3) with a deviation of 57% from E-R being observed (Figures 8a and 8b).

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

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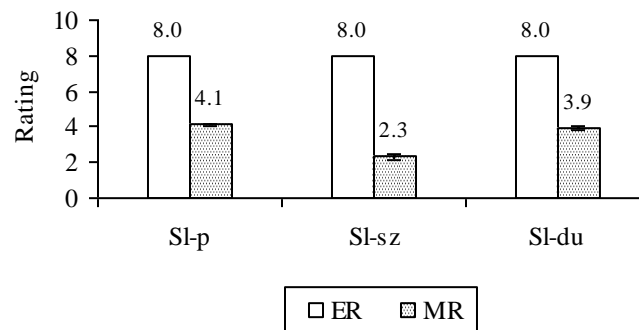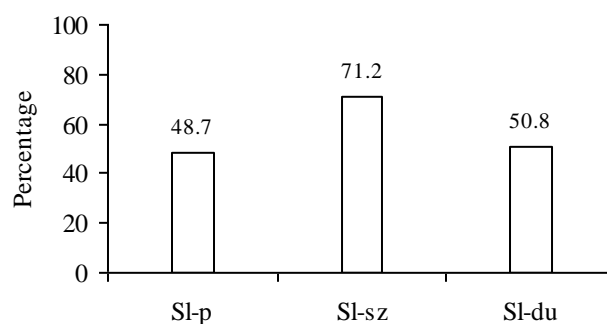
Sl-p: Sleeping place   Sl-sz: Sleeping area (size)   Sl-du: Sleep duration

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

Walk

The long distances traversed by wild elephants (Sukumar, 1989; Poole and Granli, 2009) as part of their daily activity may be completely absent in captivity due to various reasons leading to associated effects on the health and mental well-being of the elephants.

- All the elephants were given opportunity to walk, in the adjoining forests
- Time of walk was in the morning and evening, with duration ranging from 2-3 to 6-8hrs
- Mean distance covered was 6.4kms (SE= 0.2, N= 55) ranging from 2-9 km

M-R was 9.0 (SE=0.0, N*=1) with rating being assigned for only one parameter

Social interaction

Opportunity to interact with others of its own kind is integral to an elephant's life.

- All elephants, except three, were allowed to interact
- Two calves (both rescued) and a 25y old male were not provided opportunity to interact
- Interaction was allowed during grazing in the park/ in the *Pilkhana*/ shelter/feeding site/Camp site or while working
- Mean duration was 5.9h (SE= 0.7, N= 68) with individuals of diverse age and sex
- Most animals were in proximity of each other

M-R was 7.1 (0.8, N* = 3) implying a deviation of 11% from E-R (Figures 9a and 9b).
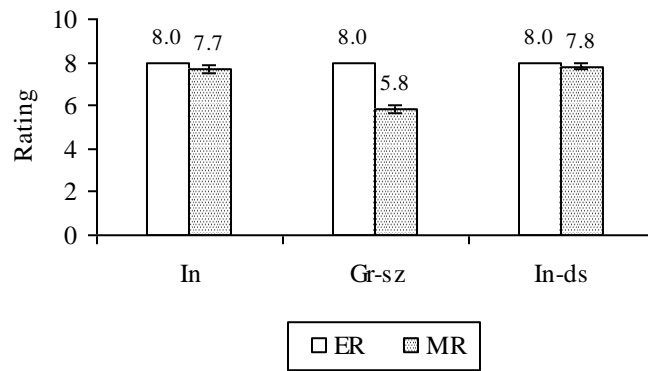
Figure 9a: Comparison of E-R and M-R for 'interaction' sub-parameters
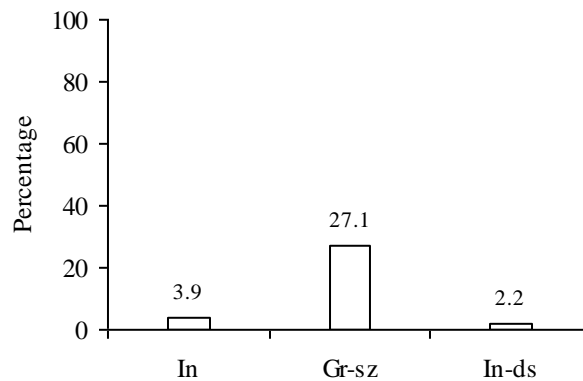
In: Opportunity for interaction   Gr-sz: Group size   In-ds: Interaction distance

Figure 9b: Percentage wise deviation from E-R for 'interaction' sub-parameters

Chaining

Elephants maybe chained either to a specific place or have chains tied to their legs and allowed to free range.

- All elephants were chained for some duration
- Except for two rescued calves (male and female), the elephants were allowed to free range at night with drag chain/ hobble
- Both rescued calves and a 25y old adult male not allowed to range free
- Region of chaining was the leg; for a few elephants, leg and neck
- Mean chain weight was 30kgs (SE= 1.8, N= 35), mean chain size 0.7cms (SE= 0.01, N= 35), mean chain length 34m (SE= 5.9, N= 37)

M-R was 2.9 (SE= 3.1, N*= 3) with a deviation of 64% from E-R (Figures 10a and 10b).
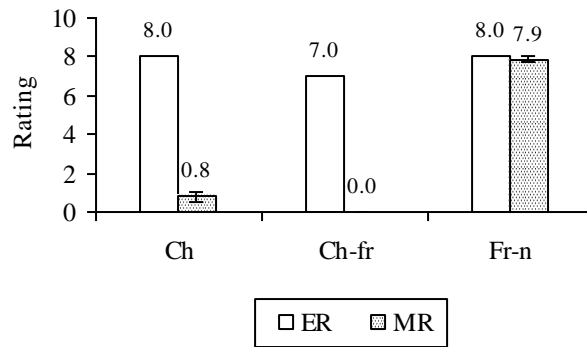
Figure 10a: Comparison of E-R and M-R for 'chain' sub-parameters
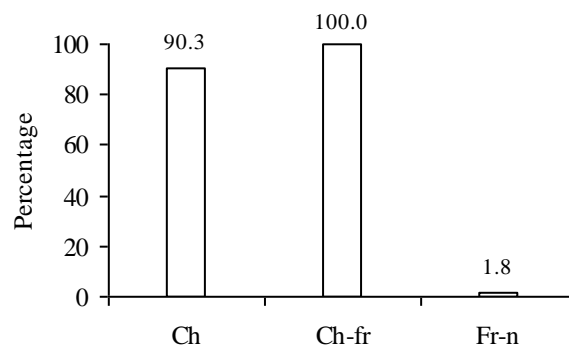
Ch: Chained/ free-ranging   Ch-fr: Chain type while free-ranging
Fr-n: Opportunity to free range at night

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

Observed behaviour
Manageability of the elephant in terms of its temperament, occurrence of stereotypy or aggression was rated.

- 90% of the elephants (N= 76) were described as reliable/ quiet
- 7% were said to be undependable/ aggressive (all male, adults) and a 4y old female as easily frightened, one elephant was described as being aggressive during musth and one a little agitated
- Only two elephants exhibited stereotypic movements: vertical shaking of head/ swaying of body when chained

Since only two sub-parameters were observed, M-R for each sub-parameter has been presented: M-R for temperament of the observed elephant was 7.3 (SE= 0.3, N= 76) with a deviation of 9% from E-R. M-R for stereotypic behaviour was 7.5 (SE= 0.3, N= 34) showing a deviation of 6% from E-R.

Work
Captive elephants are generally used for various work related activities which may/ may not be similar to the animals' natural behavioural repertoire.

- 17% (N= 71)of the elephants (all less than 7y, male/ female) were not given any work
- Work type was patrolling, safari rides for tourists
- Mean work duration was 3.4h (SE= 0.2, N= 57), in the morning/ evening
- Mean age when elephants began working was 9y (SE= 0.7, N= 55) ranging from 5-42y
- Number of working days ranged from 9-30 days/month
- When used for tourism, mean number of people carried was 3 (SE=0.2, N= 35)
- Howdah used while carrying people, howdah made of *gaddi* / *gaddela*
- Mean howdah weight was 56kgs (SE= 2.0, N= 32)
- Tree shade was available for the working elephants
- Ad lib water was available, rest given
- No food given while working

M-R was 4.9 (SE= 1.2, N* = 10) implying a deviation of 38% from E-R (Figures 11a and 11b).
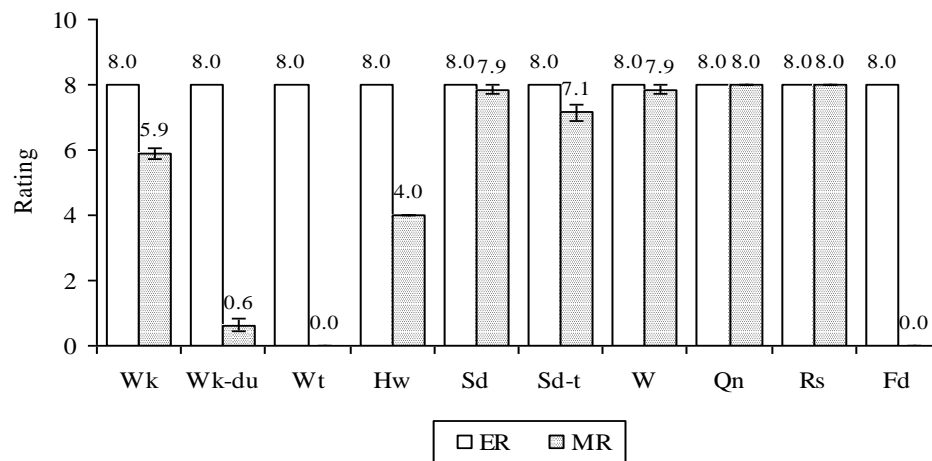
Figure 11a: Comparison of E-R and M-R for 'work' sub-parameters

Figure 11b: Percentage wise deviation from E-R for 'work' sub-parameters
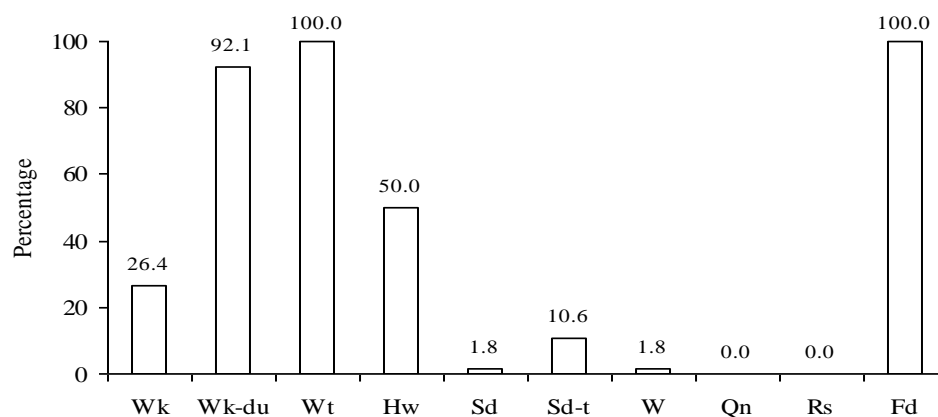
Wk: Work type Wk-du: Work duration Wt: Weight carried   Hw: Howdah type
Sd: Shade availability   Sd-t: Shade type   W: Water availability
Qn: Quantity of water provided Rs: Rest availability   Fd: Food availability

Food

Wild elephants have been observed to feed on a wide variety of plants (Mckay, 1973; Sukumar, 1991) using different parts of their body to "prepare" the food. Hence, opportunity to free range to forage/ number of stall feed items provided; provision for mineral mixtures, etc was rated. Husbandry aspects such as hygiene of feeding place, maintenance of ration chart was also considered.

- Except the two rescued calves, all elephants had access to both free-range foraging and stall feed
- Feeding place was *pilkhana* / camp site, hygiene maintenance was described as good
- Stall feed was: Banyan stem (*Ficus* sp.), Bamboo (*Bambusa* sp.) leaves, pulses, boiled paddy (*Oryza* sp.), commercial cattle mineral mixture
- For the rescued calves, food was: Lactogen commercial powdered milk supplement for babies), boiled rice, cooked pulses and commercial cattle mineral mixture
- None of the elephants were reported to have raided crop fields
- During musth, banana (*Musa* sp.) stems and cut fodder given

M-R was 6.8 (SE= 1.1, N*= 6) showing a deviation of 15% from E-R (Figures 12a and 12b).
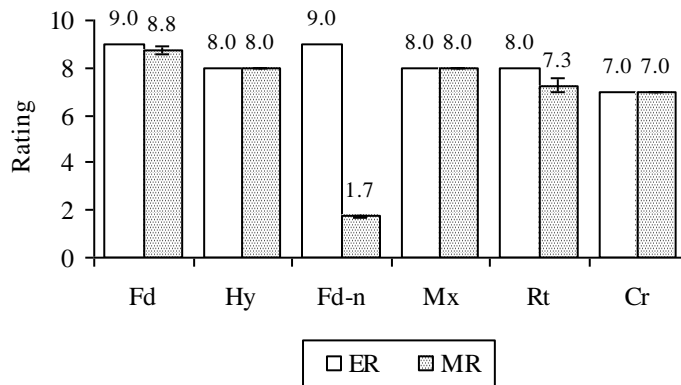
Figure 12a: Comparison of E-R and M-R for 'food' sub-parameters
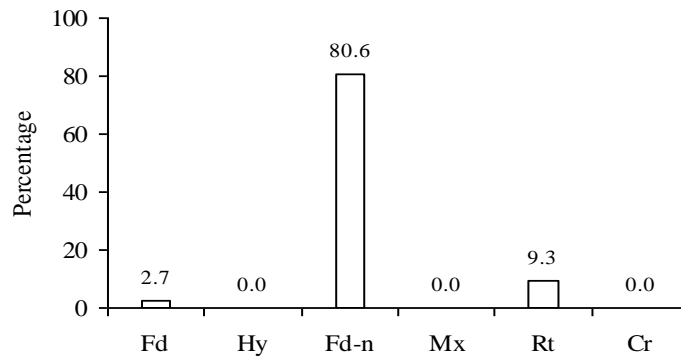
Fd: Food provisioning type   Hy: Hygiene of feeding place   Fd-n: Number of stall-fed items
    Mx: Availability of mineral mix   Rt: Use of ration chart   Cr: Visits to crop fields

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

Reproductive status

Absence of normal reproductive functioning in adult elephants is indicative of poor health/ increased stress/ absence of companions.

- For the adult females for which data was available, the elephants were said to be in oestrus cycles, exposed to males, breeding opportunity was provided, had been observed to mate, male source was both wild and captive bull, calf birth was reported with cows present during birth
- Three adult males were reported to be reproductively active; musth reported for four males (40% of the males for which data was available)
- All the males not reported to exhibit musth were between 18-23yrs
- All males aggressive during musth, hence, isolated and chained and mating with resident females not possible

M-R for female reproductive status was 6.9 (SE= 0.5, N*= 7) implying a deviation of 2% from E-R. M-R for male reproductive status was 3.1 (SE= 2.2, N*= 4) indicating a deviation of 61% from E-R (Figures 13a and 13b).
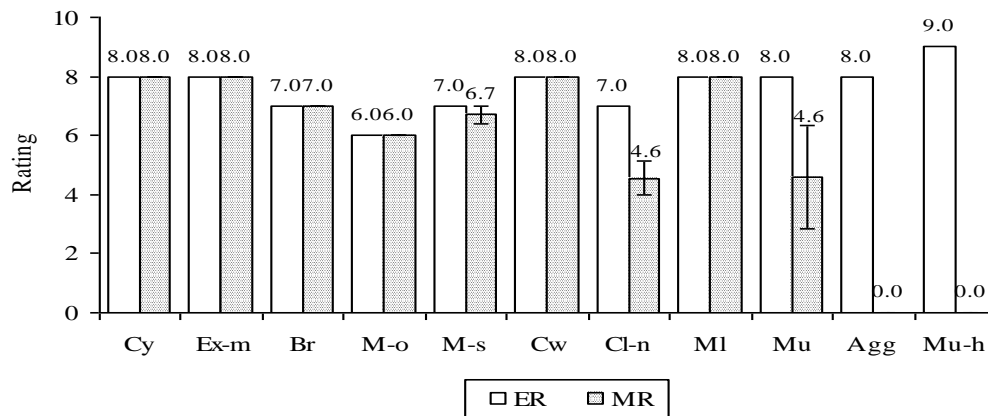
Figure 13a: Comparison of E-R and M-R for 'reproductive status' (male/ female) sub-parameters
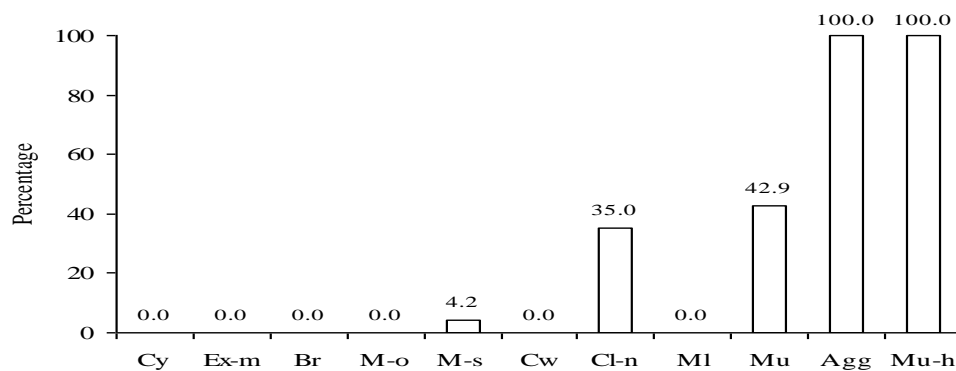
Occurrence of oestrus cycles   Ex-m: Exposure to males Br: Opportunity for breeding
M-o: Mating observed M-s: Male source Cw: Presence of cows during calf-birth
Cl-n: Number of calves born Ml: Reproductive activity male   Mu: Musth occurrence
Agg: Aggression during musth   Mu-h: Handling of musth

Figure 13b: Percentage wise deviation from E-R for 'reproductive status' (male/ female) sub-parameters

Health and veterinary schedule

Captivity may predispose the elephants to a number of health issues: foot problems, excessive/ deficit weight/ exposure to diseases from domestic animals/ humans.

- Occurrence of diarrhea/ worm infestation, uro-genital infection, toe nail cracks, pododermatitis and abscesses was reported
- Foot injuries/ problems was reported for seven elephants
- All the observed elephants had been dewormed once in six months
- Immunization against haemorrhagic septicemia/Anthrax/ tetanus/ foot & mouth disease was done annually
- Oiling was not practiced
- Samples of blood/ dung/ urine were tested as and when required
- Body measurements were not taken regularly, except for an adult female which was measured annually

M-R was 5.4 (SE= 0.9, N*= 9) with a deviation of 22% from E-R (Figures 14a and 14b).
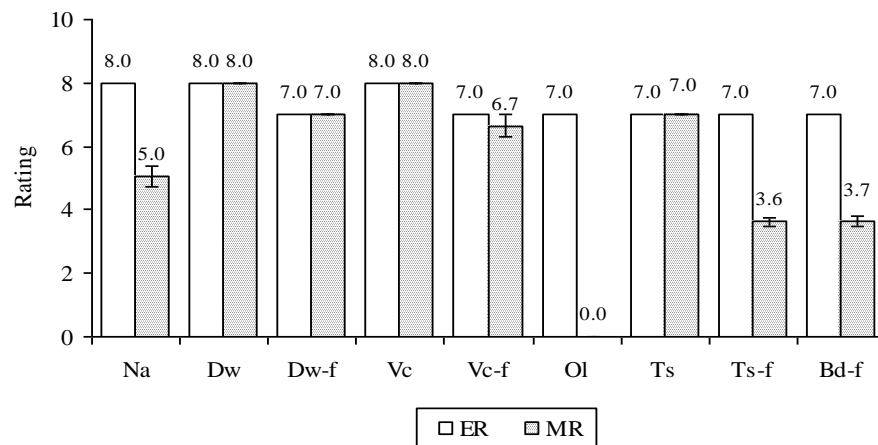
Figure 14a: Comparison of E-R and M-R for health and 'veterinary schedule' sub-parameters
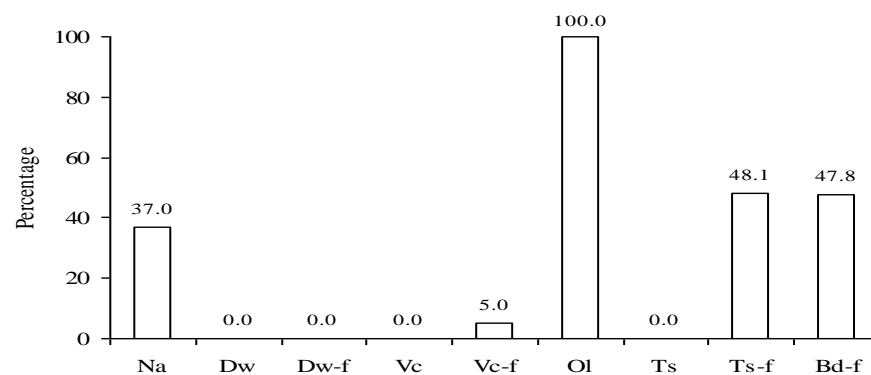
Na: Nature of disease/ injury   Dw: Deworming done   Dw-f: Frequency of deworming
Vc: Vaccination done   Vc-f: Frequency of vaccination   Ol: Oiling done
Ts: Dung/urine/blood sample tests   Ts-f: Frequency of sample testing
Bd-f: Body measurement frequency

Figure 14b: Percentage wise deviation from E-R for health and 'veterinary schedule' sub-parameters

Veterinary personnel and facilities

- All the elephants had access to a veterinary doctor with experience in treating elephants
- Experience with elephants was 3-4y
- Doctor's visits were weekly/ fortnightly
- 81% camps had veterinary assistants
- Service register/ medical register was maintained
- Infrastructure availability included veterinary clinic with limited medical facility, staff quarters, cooking shed/ vessels, provision shed, animal stand and camp site

M-R was 5.8 (SE= 0.9, N*= 7) with a deviation of 27% from E-R (Figures 15a and 15b).
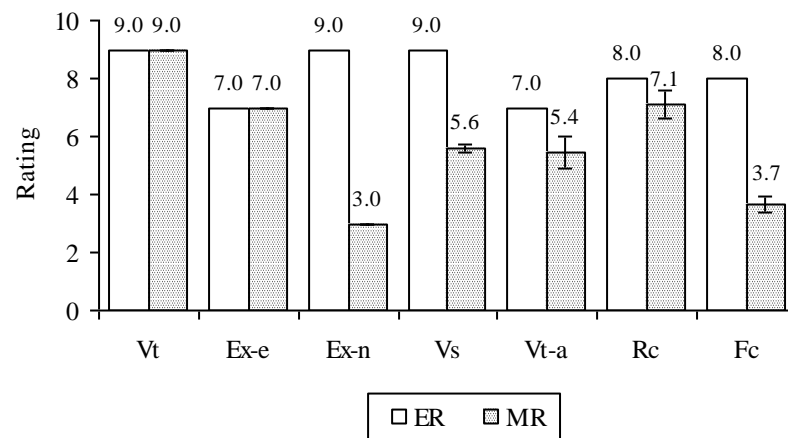
Figure 15a: Comparison of E-R and M-R for ''veterinary personnel and infrastructure'' sub-parameters
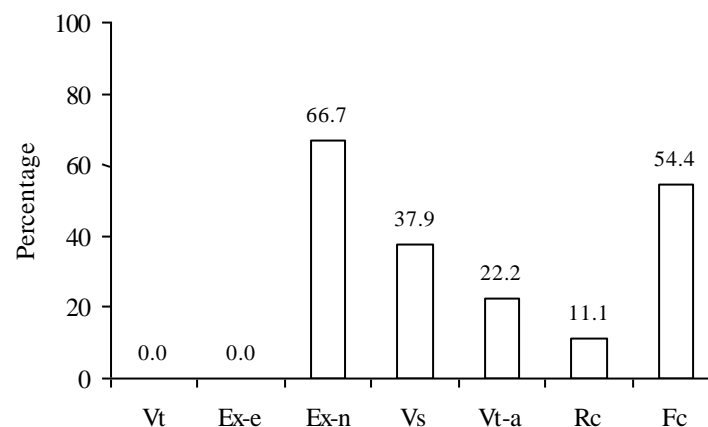
Vt: Availability of veterinary doctor   Ex-e: Experience with elephants
Ex-n: Number of years of experience Vs: Frequency of visits
Vt-a: Availability of veterinary assistant   Rc: Record keeping
Fc: Facilities available

Figure 15b: Percentage wise deviation from E-R for 'veterinary personnel and infrastructure' sub-parameters

Handlers' experience and socio-economic status
Mean age of handlers was 40yrs (SE= 1.5, N= 25) ranging from 27- 53yrs.
Professional experience
Little experience in handling elephants can be dangerous for both handler / elephant.

- Experience in this profession ranged from 6-30y
- Experience with a specific camp elephant ranged from 1-22y
- Except for one, all handlers chose this profession to earn a living. One mahout chose this profession as it was a family tradition and to earn a living
- Only 21% handlers had undergone training in the profession
- Mean number of hours spent with elephant was 9h (SE= 0.4, N= 24)
- All used tools to control their elephant, tools were: Ankush, *Gupti* (foot-length goad with small metal tip at one end), *Khukri* & bamboo stick

M-R was 4.8 (SE= 1.7, N*= 5) showing a deviation of 47% from E-R (Figures 16a and 16b).
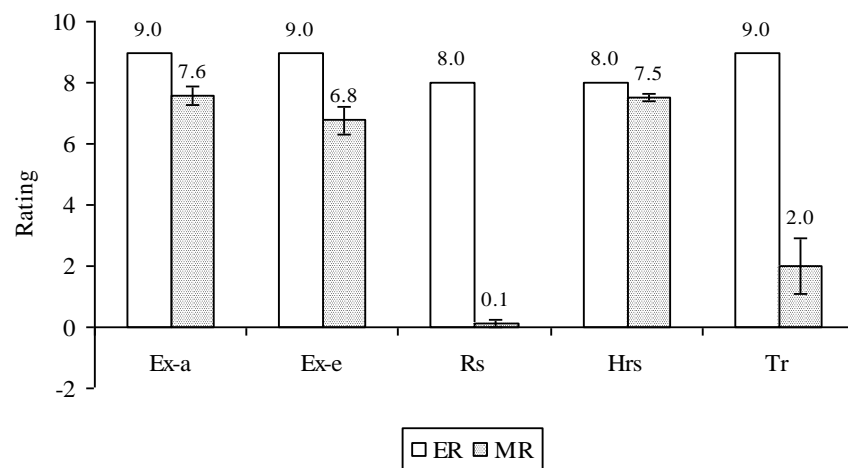
Figure 16a: Comparison of E-R and M-R for handlers' professional experience
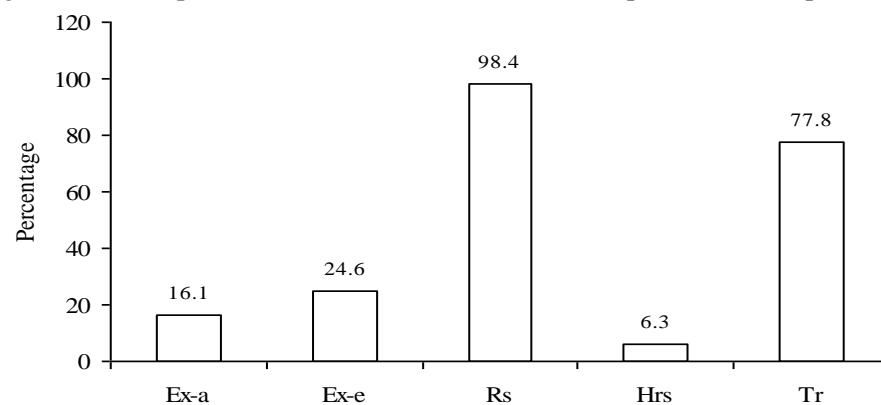
Ex-a: Experience as percent of handler age   Ex-e: Experience as percent of elephant age
Rs: Reason for choosing this profession   Hrs: Hours spent with elephant
Tr: Training undergone

Figure 16b: Percentage wise deviation from E-R for handlers' professional experience

Socio-economic status

- Sixty eight percentages of handlers belonged to the tribal/ Muslim community (N = 22)
- Seventy four percentages did not have any relatives in the same profession
- Only 1% of the handlers mentioned having a father/ grandfather working/ having worked in the same profession
- 3% of the handlers were not educated
- Number of languages known varied from 1-3
- Mean annual salary drawn was Rs.91217/- (N=23) ranging from Rs.72000-96000/-
- Number of children/ family was three, ranging from 1-5
- None of the handlers had any insurance cover
- Mean number of elephants each handler had worked with was 3 (N=23) ranging from 1-5; this was attributed to the system of rotation of handlers or retirement from service
- Fifty seven percentages of handlers consumed alcohol, with most said to drink after work

M-R was 3.3 (SE= 0.9, N*= 10) indicating a deviation of 53% from E-R (Figures 17a and 17b).
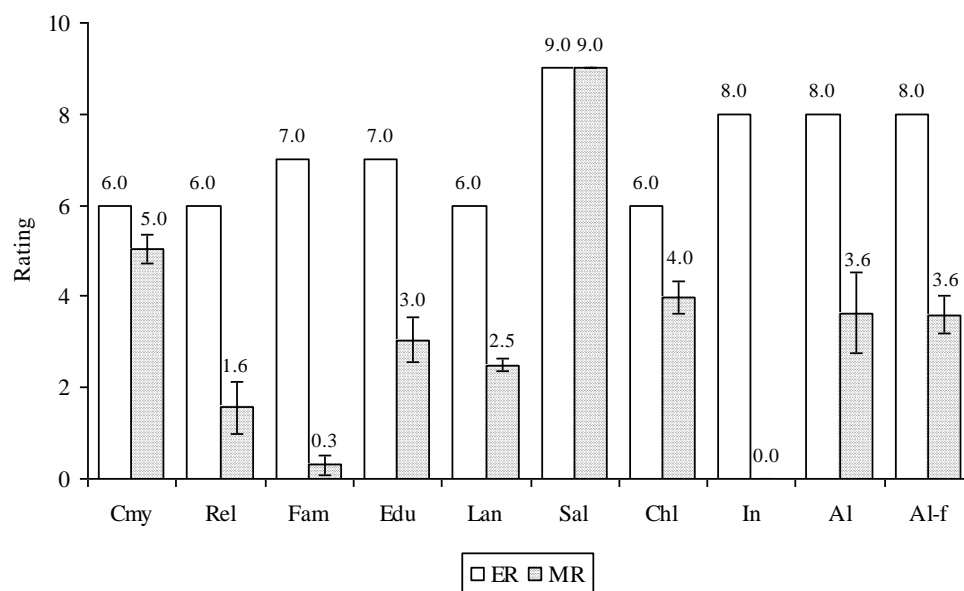
Figure 17a: Percentage wise deviation from E-R for handlers' socio-economic status
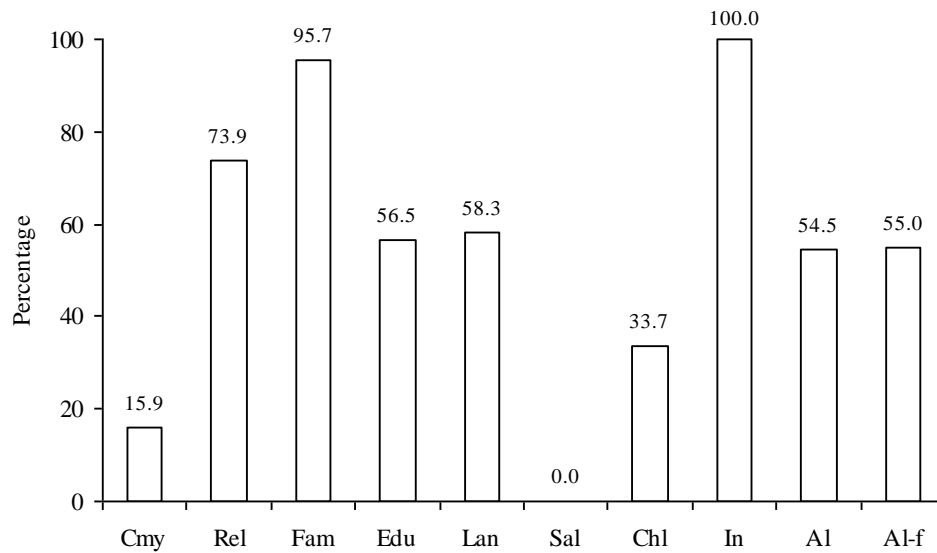
Cmy: Community   Rel: Relatives as handlers   Fam: Family occupation   Edu: Education level
Lan: Languages known   Sal: Salary drawn   Chl: Number of children   In: Insurance availability
Al: Alcohol consumption   Al-f: Timings of consumption

Figure 17b: Percentage wise deviation from E-R for handlers' socio-economic status

Overall welfare status
Distribution of Percentage wise deviation from E-R

Figure 18 gives the number of occurrences of different deviation classes for all the sub-parameters observed. The number of occurrence of no deviation from E-R and those that deviate by 50% or more are nearly equal (N = 17 for deviations >/= 50%). Zero deviations were spread across all parameters with most being represented by reproductive status (male/ female) and shelter. It should, however, be noted that of the parameters where < 25% population was represented, seven were reproductive parameters. Of the remaining four reproductive parameters (total = 11), only 25% population was represented.
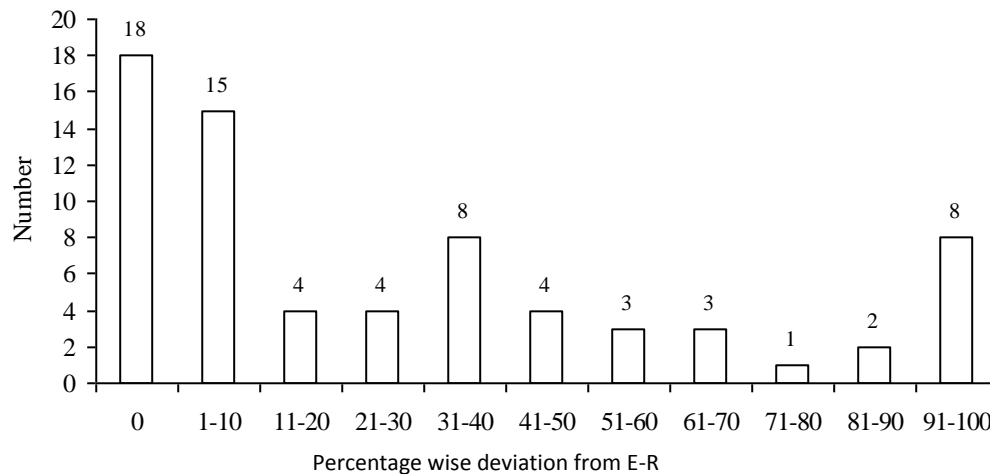
Figure 18: Distribution of Percentage wise deviation from E-R

Discussion

Captivity brings in the factor of control by people in many aspects of the elephants' life. It is this control which may/ may not be conducive to their welfare and which has been rated through differences observed between wild and captive conditions. Parameters for assessing welfare covered physical, social, physiological and veterinary features. While sub-parameters/ parameters across various aspects showed little deviation from what the experts considered to be acceptable (figure 25), the same was true for deviations accounting for > 50% from acceptable standards. This implies non-uniformity of captive conditions for the elephants as some sub-parameters representing a feature were considered to be acceptable while other sub-parameters of the same feature deviated from the experts' standards.

Some of the sub-parameters which showed > 50% deviation from E-R were:

- Chaining in *Pilkhana* or in camp, hobbling the elephants while ranging-free: use of chains to control movement of animals is a widespread practice in captivity. While this practice maybe considered an essential tool for captive elephants by some, it has a cumulative effect through its role in restricting the elephant's ability to move (as has been mentioned in the following text). In addition, persistent chaining of the same regions may lead to injuries which may prove to be difficult to heal (Kurt and Garai, 2007).
- The practice of chaining resulted in less than ideal conditions of shade type and sleeping conditions as the animals were restricted in their ability to move freely.
- The same was true for the supplement food provided through stall feed: with greater restriction on movement (duration ranging from 3.5 − 12h) the time available for the elephant to forage was reduced. Hence, lack of variability during stall feed may prove to be a source of poor nutrition. Restricted foraging duration is also indicative of deviation from activity observed for wild elephants. In the wild, elephants may spend 12-18h foraging (Sukumar, 1991).
- Work conditions such as duration (54% said to work for 2-3h) with 70% elephants working for at least 20 days/ month and use of cushioned-howdah were not favorable. While the use of non-metal howdah is a good practice, it can prove to be a hindrance during hot/humid conditions when body temperatures increase following physical exertion. Longer work duration can impinge on the time available for the elephants to engage in species-typical behaviours. Food was not provided while working.
- All male elephants in musth were isolated and chained, preventing free movement and access to females. This would lead to non-performance of species-typical behaviours characteristic of males.
- Change of mahout per elephant: frequent changes may disrupt the bond, if any, formed between handler and elephant. Changes of mahout within a camp may help to certain extent as all might follow the established schedule for the camp's elephants. But even within a camp, it is only the handler spending time with his elephant who will know the idiosyncracies of his elephant. Thus, frequent change will not only erase that knowledge, it might even not give allow handlers to get to know their elephant. In addition, the elephant has to develop a sense of "trust" with his handler which may not be possible if they are changed often.
- Disease and veterinary care: number of years of experience of the veterinary doctor and veterinary care facilities available showed more than 50% deviation from E-R. Both factors are integral to maintaining health of captive elephants. The occurrence of foot

problems (toe nail cracks/foot rot) was seen in 30% of the observed elephants. In a study conducted by Harris et al., (2008), the authors reported no difference in the occurrence of foot problems between zoo elephants in the U.K. and those observed in extensive (FC) system in Kaziranga. They attributed this to the lack of veterinary care and heavy work schedule.

Maintenance of elephants in their natural physical environment may be a first step towards providing better welfare conditions. Features conducive to elephant welfare:

- Maintenance of elephants in their natural physical environment
- Access to forest vegetation for foraging (but, restricted)
- Rivers/ streams for bathing/ drinking
- Access to wild bulls for mating
- Occurrence of captive born elephants in FCs implying a normal reproductive process for female elephants. But data regarding long-term policy of handling an increasing captive population was not available.

Handler welfare
- The professional status of handlers was good with most having experience of ten or more years in this occupation; the same could not be said regarding their experience with a specific elephant with nearly half having less than ten years experience
- While the mean salary drawn could be considered good, none of the handlers was insured.
- More than half of the handlers consumed alcohol, mostly after work

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Section 4
Captive elephants in the forest camps of Karnataka

Executive summary

This study aims at measuring the welfare conditions of captive elephants managed by the Forest Department in various camps. A total of 88 elephants were observed in forest camps managed by the Forest Department in nine locations across different districts of Karnataka. Observations of the animal included were animal's physical environment, occurrence of stereotypy, health status, management practice adopted regarding feeding, bathing, work type and other daily routines.

Each of these parameters was rated on a scale of 0 to 10 with 10 representing ideal living conditions for the animal as experienced by it in its wild state. 0 represents the worse possible situation for the animal for that parameter. Some parameters were studied in terms of sub-parameters. The number of parameters observed for each elephant varied from 16 to 60 while it varied from 1–16 for mahout and 1 to 15 for cawadi.

Mean age of the observed elephants was 32.5 years with age ranging from 1 to 73 yrs. Mean female age was 36 yrs, while that for males was 30 yrs. Thirty-seven elephants seem to have been captured from the wild with age at capture varying from 7–8 to 38yrs. The mean rating for forest camps to source elephant was 4.0 indicating a lesser proportion of elephants being captive born while 60% of the elephants seem to have been captured from the wild.

Change in ownership of the animal has been rated and mean rating was 1.6, with 94% of the elephants getting a rating of 1.0 indicating shift from a natural wild state to one with semi-natural conditions.

All the elephants observed belonged to forest camps and hence the forest itself was the shelter. The parameter 'shelter' was rated using five sub-parameters to include different aspects of the enclosure. The overall mean for shelter was 9.61 with mean scores for each elephant ranging from 4.7 to 10 with 89% being given a rating of 10 and none scoring 0.

Sources of water for drinking and bathing were varied with rivers/streams forming 53 and 58.97%, respectively, of different types. Mean duration of bath was 2 h ranging from 0.3 to 4 h. Ninety-six percent of the elephants received <4 h for bath duration. Overall mean rating for water (drinking and bathing) was 8 with values ranging from 4.20 to 8.93 for each elephant.

All the observed elephants were allowed to rest and sleep in forest or natural conditions with access to shade. Overall mean rating for sleep parameters, consisting of three sub-parameters was 8.1 with each elephant rating value ranging from 1.7 to 10.

Almost all the observed elephants were allowed to interact with other animals in the camp. Each elephant was allowed interaction with a mean number of 8.6 individuals. Overall mean for interaction was 8.9 with mean rating ranging from 0 to 10 for individual elephants.

Seventy-two percent of the animals were described as calm while 22% were nervous or frightened. Overall mean rating for behaviour was 7.0 with values ranging 0 to 10 for individual elephants.

Mean duration for which the animals were chained was 10 h with duration ranging from 0 to 24 h. Mean weight of chain used in tying the animals' legs was 36Kg. Mean chain length was 8m.

Work type varied from carrying tourists for safari, logging, patrolling, as kumki, supplying rations to anti-poaching camps or being a part of the annual 'Dasara'[1] procession. Of the 47 elephants observed, 38% were used for tourist-related activity. Nineteen percent of the animals were not given any work.

Mean rating for work-related parameter was 5.0 with values ranging from 0.6 to 10. Thirty percent of the animals were given a rating less than 3.0 implying unsuitable work type while 19% were given a rating of 10 showing use of the animals in suitable work type.

Seventy-eight percent of the elephants were provided both stall-feeding and allowed to range free. Among the food provided, jaggery (sweet derived from sugarcane *Saccharum* sp.) was the most common followed by ragi (*Eleusine coracana*). Sixty-six percent of the places reported using a ration chart for feeding the elephants. Overall mean rating was 7.0 with values ranging 0.38 to 10.

All the elephants were said to exhibit oestrus cycles were exposed to male animals and the male's source was both captive and wild. The mean number of birth of calves was 3.0. Ratio of male: female calves born varied from 1: 0 to 1: 3. Mean age of elephant at first birth was 31 years. Mean calving interval was 4.5 ranging 3.5–6 yrs. Overall mean for female reproductive status was 8.0 with values ranging from 0 to 10.

Male elephants were assessed for reproductive status by parameters such as: whether reproductively active/not, occurrence of Musth, exposure to females, etc. Overall mean rating was 6.0 with mean values for individual elephants ranging from 0 to 10.

Twenty-three elephants had undergone incidence of disease/ injury. Stomach-related problems such as diarrhoea were common. Health status was assessed by rating 13 sub-parameters and overall mean for health status was 7.0 with mean rating for individual elephants ranging from 0.25 to 10. Veterinary doctors were available for all the animals observed, with 98% of the doctors having experience in treating elephants. Eighty-six percent of the camps also had the service of a veterinary assistant.

The parameter veterinary care was assessed using sub-parameters such as availability of veterinary doctor, doctor's experience with elephants, years of experience, availability of veterinary assistant, etc. Overall mean rating was 9.0 with ratings for individual elephants ranging from 7 to 10.

Average age of mahout was 43 years with a mean experience of 16.3 years. Only two mahouts expressed interest in being a mahout and hence preferred to join the profession. Welfare status and work experience of mahout and cawadi were assessed across 17 parameters each. Overall mean rating for mahout was 7.0 and 6.0 for cawadi and the difference between these two means was not significant. When the overall rating, across all parameters, was compared, the mean rating for elephants was significantly different from that of the mahout rating.

The percentage occurrence of individual values across all parameters observed for elephants indicates that the values of 10 dominate and the values ranging from 5 to 10 contribute 76% suggesting the moderate to satisfactory conditions of elephant-keeping found in forest camps of Karnataka.

Introduction

There are several camps run by the Forest Department of Karnataka, in different districts, which maintain elephants. A relic practice of keeping elephants by the erstwhile kings/ queens of the state/ for timber operations during the British period, the camps have continued with the purpose evolving into use for forest related work. These elephants are exposed to a range of natural to semi-natural living conditions across camps. The life of captive elephants is controlled by conditions/ environment provided by people, making a study of the existing captive conditions imperative from the perspective of the non-domestic nature of captive elephants (Lair, 1997, Kurt and Garai, 2007).

Objective of the study

This study aims at measuring the welfare conditions of captive elephants managed by the Forest Department in various camps by observing the physical environment of each animal, its morphology, behavioural characteristics and physiological features along with several parameters relating to the economic, social and animal-oriented attitude of mahouts.

Method

A total of 88 elephants were observed (55 Males, 33 females) in forest camps managed by the Forest Department in nine locations across different districts of Karnataka. Each animal was sampled to record morphometric observations of the animal, its physical environment, occurrence of stereotypy, health status, land management practice adopted regarding feeding, bathing, work type and other daily routines.

Each of these parameters was rated on a scale of 0 to 10 with 10 representing ideal living conditions for the animal as experienced by it in its wild state. 0 represented the worse possible situation for that parameter. Kane et al., (2005) suggest providing captive conditions for elephants based on the needs of the individual animal and the species' characteristics in terms of its biology, habitat needs and its cognitive ability. For this report, ideal living conditions were those approximating wild conditions: the greater the deviation from the wild, the lesser would be the score for that parameter/ sub-parameter.

Some parameters were studied in terms of sub-parameters. For instance: the shelter provided to the animal was sub-divided into a number of factors such as: shelter type—whether the shelter was made of asbestos sheets or concrete or natural materials, shelter size and floor type.

A shelter made of asbestos sheet was given a lower rating than that made of natural materials, as asbestos sheets tend to be less conducive to extreme variations in temperature than those of thatched roof. A shelter with natural forest conditions is given higher value than one with a thatched roof.

The welfare status of the Forest Camp (FC) elephants was assessed by recording observations for 75 parameters, while 17 parameters each were recorded for the mahout/cawadi. Each parameter has been averaged across the sampled animals and the mean rating presented. Sub-parameters have been averaged to give the overall mean for that particular parameter.

Results
Population status
Mean age of the observed elephants was 32.5 yrs (S.E. = 0.06, N = 75) with age ranging 1–73 yrs. Mean age for females was 36.14 (S.E. = 0.19, N = 28) while that for males was 30.40 (S.E. = 0.1, N = 47). The number of parameters observed for each elephant varied from 16 to 60 while it varied from 1 to 16 for mahout and 1 to 15 for cawadis.

Source of the elephant
Thirty-seven elephants (58.73%) were captured (Figure 1) from the wild, with age at capture varying from 78 yrs to 38 yrs (approximately). The reasons for capture were: raiding crops and charging at or killing people (33.33% elephants), 25% raiding crops and 8.33% charging at people (N = 24).
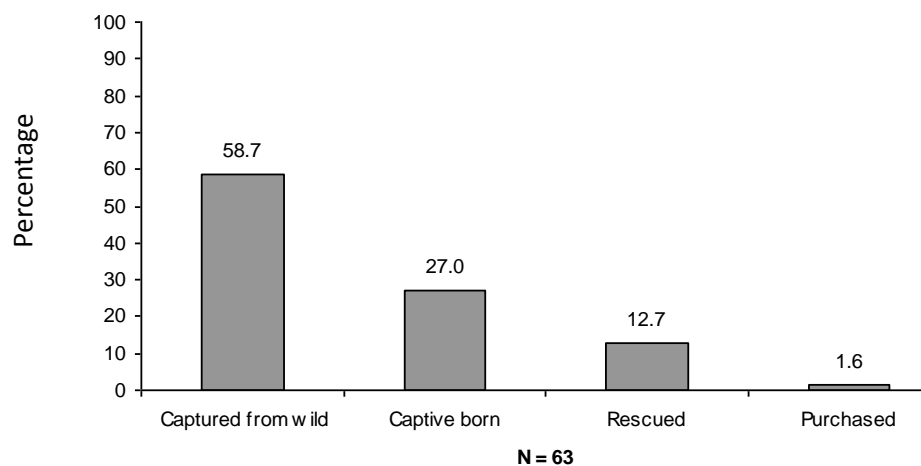

Figure 1: Source of elephants for forest camps in Karnataka

The mean age of elephants in the camp that were captive-born was 7.63y (S.E. = 0.15, N = 19) with a male: female ratio of 8:11 and age ranging from 1 to 34 yrs. Recorded birth ranged from the years 1971 to 2004 (Figure 2).
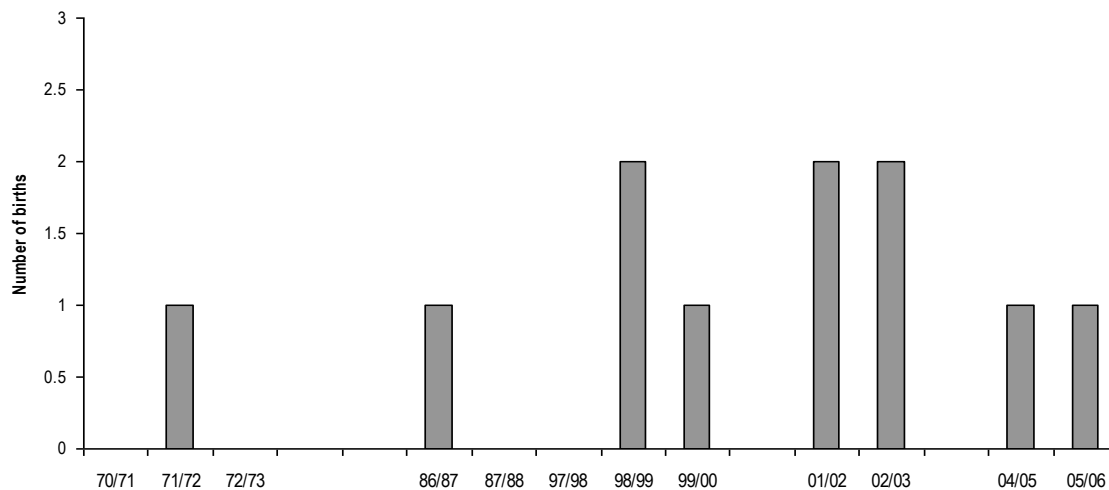

Figure 2: Year–wise number of captive-born elephants for forest camps in Karnataka

98

The mean age of elephants in the camp that have been captured from the wild was 40.35 yrs (S.E = 0.10, N = 49) with a male to female ratio of 36:13. The age ranged from 5 -73 yrs. The mean age unknown/rescued from circus elephants in the camp was 43.15y (S.E. = 1.29, N= 13) with a male to female ratio of 11:9 with age ranging from 6 to 69y. However, the total number of such elephants was 20 (age was not known for the others). The parameter source of elephants provides a measure of the origin of the elephant, whether born in captivity or was caught from the wild or obtained from other sources. The mean rating for forest camps was 4.0 (S.E. = 0.03, N = 66) indicating a lesser proportion (29%) of elephants being captive-born while 60% have been captured from the wild. Fifty percent of the elephants that had been captured from the wild for crop-raiding continued after capture too.

Type of previous owner
Captive elephants are transferred between facilities for various management reasons. The change in ownership of the animal has been designed such that high values imply change from adverse conditions such as unnatural living environment/harsh training/work schedule, etc. to one with the existence of natural or semi-natural conditions for the animal. Mean rating was 1.6 (S.E = 0.1, N = 16) with 94% of the elephants being given a rating of 1.0 indicating shift from a natural wild state to one with semi-natural conditions.

Shelter
All the elephants observed belonged to forest camps and hence the forest itself was the shelter. The size of the shelter was thus vast and open. The elephants had earthen flooring, except for 45 yrs, female, which had concrete flooring only during the day. Natural shade of forest trees was available for all the elephants observed, except for Vishnu (male, 37 yrs) which had provision of a tree-shade of size 20 X 20 ft. This parameter was rated using five sub-parameters to include different aspects of the enclosure. The overall mean for shelter was 9.61 (S.E. = 0.15, N = 5) with mean scores for each elephant ranging from 4.7 to 10 with 89% getting a rating of 10 and none scoring 0. The elephant Gayatri (female, 45y) was given a rating of 4.69 (S.E. = 0.70, N = 4)

Housing conditions were rated based on the extent of availability of natural environment for the animal. Mean score was 9.3 (S.E. = 0.02, N = 68) with values ranging from 2.5 to 10. Eight percent of the shelters were given a rating of 2.5 (Murkal camp 3, Hebballa 1, MettiKuppa 1, rest camp not known) which shows that the elephants were restricted in their movements within an enclosed space. High scores reflect the occurrence of free-ranging opportunity in forest conditions. Mean rating for shelter size was 9.8 (S.E. = 0.02, N = 59) with values ranging from 0 to 10. The shelter size for the elephant Vishnu (Male, 37 yrs, Murkal camp) was less than 1250 sqm and hence was given a rating of 0 indicating less than ideal size of shelter.

Floors that replicated natural substrates were given higher scores. Mean rating for floor type was 9.83 (S.E. = 0.02, N = 58) with values ranging from 0 to 10. The floor type for elephant Gayatri (45 yrs, female) was given a rating of 0 indicating substrate to be hard. Availability of shade was given a rating of 10, while non-availability was assigned 0. The mean rating for this parameter was 10 (S.E. = 0, N = 55) indicating provision of shade for all the elephants observed. High rating reflects availability of natural shade under free-ranging conditions. Lower values indicate provision of man-made structures for shade and/ or restricted movement for the elephant. Mean

rating for shade type (Figure 3) was 9.12 (S.E. = 0.03, N = 51) with values ranging from 2.5 to 10. Only nine per cent (Figure 4) of the camp elephant scored 2.5 for this parameter indicating restricted movement of the animal along with provision of natural shade (Murkal camp 3, Hebballa 1).
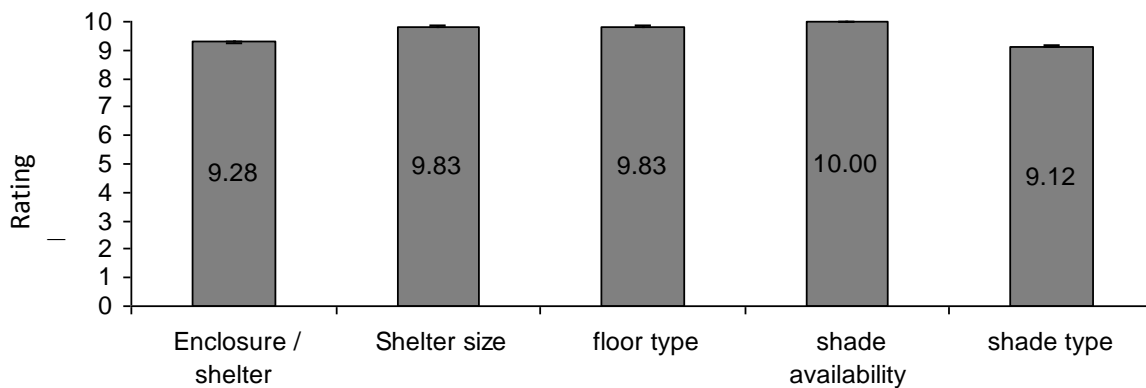
Figure 3: Mean ratings for shelter-related parameter for captive elephants from forest camps of Karnataka
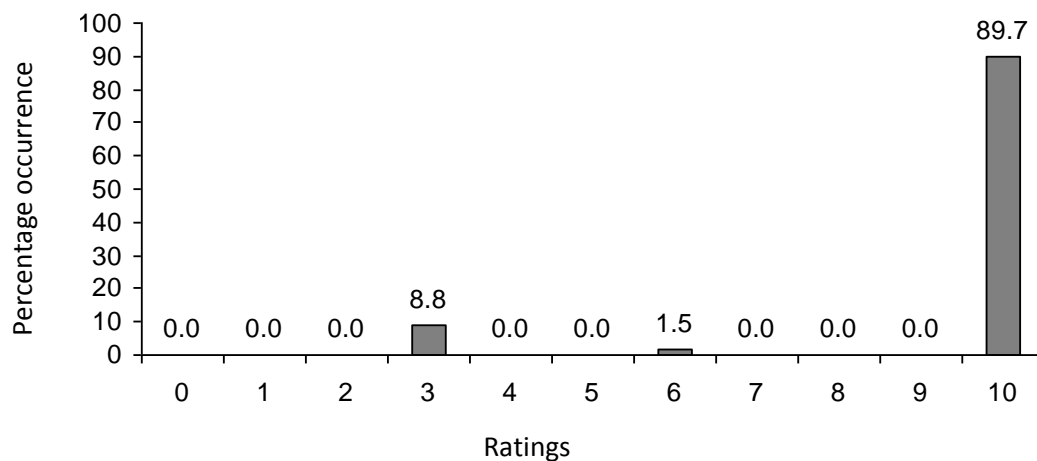
Figure 4: Percentage occurrence of mean ratings for forest camp elephants for shelter in Karnataka.

Water availability and quantity for drinking and bathing

Sources of water for drinking and bathing were varied with rivers/streams (Figure 5) forming 53.25 and 58.97%, respectively, of different sources (N = 78). The elephants were reported to drink 2.4 times per day on average (S.E. = 0.01, N = 69). The mean quantity of water the animals drank was 97 l (S.E = 0.2, N = 55), ranging from 2 to 600 l. Sixty-seven percent of the elephants were reported to drink <100 l of water per day. The mean number of times the elephants were bathed was 1.72 (S.E. = 0.01, N = 57) with minimum size of bathing place recorded being 37.17 sqm.

The mean duration of bath was 1.71 h (S.E = 0.01, N = 69) ranging from 0.3 to 4 h. Minimum duration of 10 minute was recorded for the elephant (female, 1 yr). Ninety-six percent of the

elephants received <4 h for bath duration (N= 69). Thirty percent of the elephants were bathed using naturally available materials like *Mundakai* (*Pandanus spp.*) or other fibres. Other materials used were brick, brush or stone (N = 70).
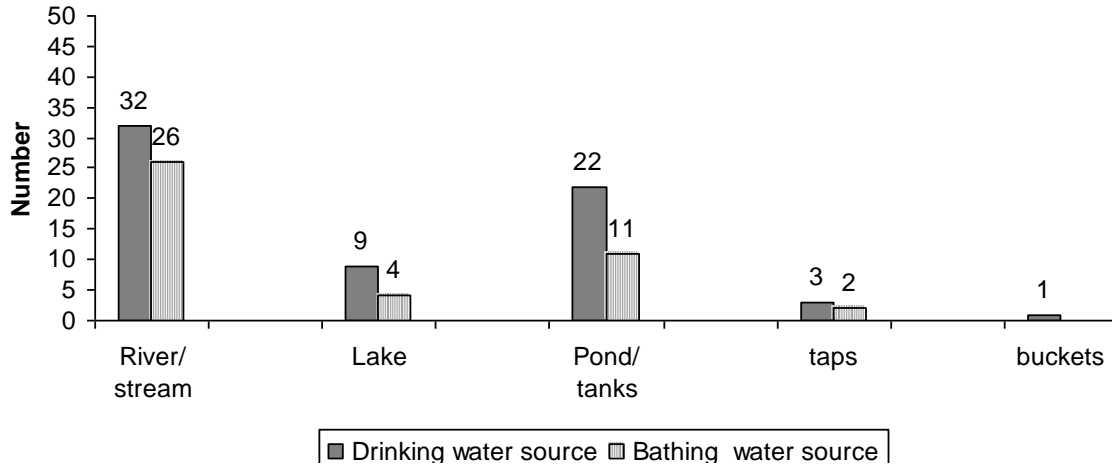
Figure 5: Source of water for captive elephants from forest camps in Karnataka

Provision of water for bathing and drinking was rated over eight sub-parameters which included quantity and quality provided as well as the place of its availability. Higher ratings reflect the occurrence of near-natural conditions, i.e., availability of running water under free-ranging conditions in forests. Overall mean rating for water-related parameter (Figure 6) was 7.77 (S.E. = 0.18, N = 8) with values ranging from 4.20 to 8.93 for each elephant. Elephant Gayatri (45 yrs, female) was given an overall rating of 4.20 as the animal was reportedly using lake water for drinking and bathing and materials used for scrubbing were brush and stone.

DWS = Distance to water source   DrWS = Drinking water source
BWS = Bathing water source   QW = Quantity of water drinking /day
BN = Bathing no. of times/day   BP = Bathing place
BD = Bathing duration   BM = Bathing materials

Figure 6: Mean ratings for water-related parameters for forest campelephants of Karnataka.

Percentage of occurrence of mean ratings of forest camp elephants for water-related parameter show (Figure 7) that 83% fall between 7 and 9.

Figure 7: Percentage occurrence of ratings for water-related parameters for forest camp elephants in Karnataka.

Closer sources of water were given higher rating as it ensures easy accessibility to the animal. Mean rating for this parameter was 5.7 (S.E. = 0.03, N = 68) implying an average distance of 500–600 m. Thirty-eight percent of values were more than or e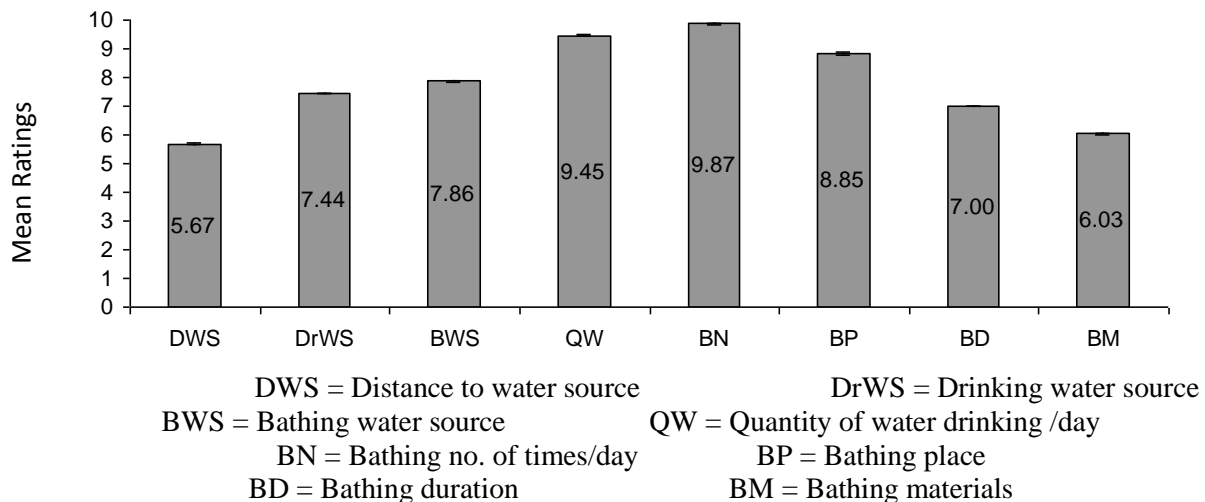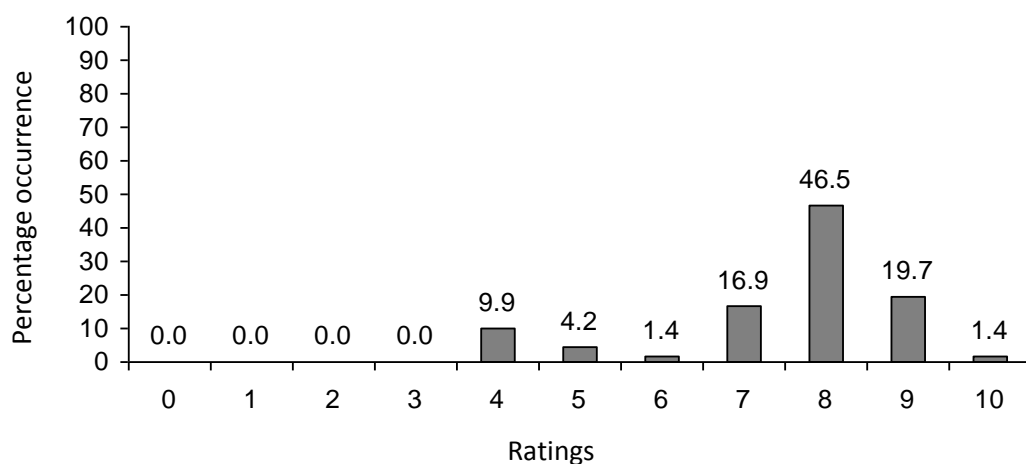qual to three meaning that the distance ranged between 700 m to more than a kilometer and six elephants were given a rating of 0 (distance > 1 km) for this feature. Higher ratings were given for sources that provided running water while stagnant sources were given lower scores. Mean rating was 7.44 (S.E. = 0.03, N = 66) with scores ranging from 1 to 10. Sixty three percent of the elephants were given a rating between 7 and 10 showing accessibility to running water. One elephant in Murkal camp was given a rating of 1 indicating provision of water in pots or buckets.

Scores emphasize accessibility of water for the animal as higher scores indicate ease of access. Mean rating was 9.87 (S.E. = 0.02, N = 31) with values ranging from 2.5 to 10. Forty six percent of elephants were given a rating of 10 while only one animal, from Kallahalla camp was given a score of 2.5 implying that the animal is drinking less than normal quantity of water. Elephants that are bathed at least twice a day were given a rating of 10 while those that were bathed in lesser frequency were given lower scores. Mean rating was 9.87 (S.E. = 0.02, N = 31) with values ranging from 9 to 10 indicating near-ideal bathing frequency. Ratings were designed to include free-ranging opportunity allowed for the animals. Thus, higher values indicate a balance between time needed for a thorough bathing and free-ranging duration. Mean rating was 7.0 (S.E. = 0.02, N = 69) with values ranging from 2.5 to 10. Only two elephants were given a rating less than 3 indicating lesser bathing duration.

Availability of rest and resting place
All the observed elephants were allowed to rest and sleep in forest or natural conditions with access to shade. Sixty-five percent of the elephants slept at night, while 32% slept during the day as well (N = 34) and one elephant (male, 4 yrs) slept during the day (*N* = 34). Higher ratings were given for parameters that replicated natural conditions. If the sleeping place had hard substrates, it was given a lower rating as compared to the one with natural conditions.

Overall mean rating for sleep parameters (Figure 8), consisting of three sub-parameters, was 8.1 (S.E. = 0.73, N = 3) with ratings ranging from 1.7 to 10. A calf at the Murkal camp was given an overall mean score of 1.7 for sleep-related variables representing restricted and unnatural space for sleep as well as occurrence of sleep during daytime.
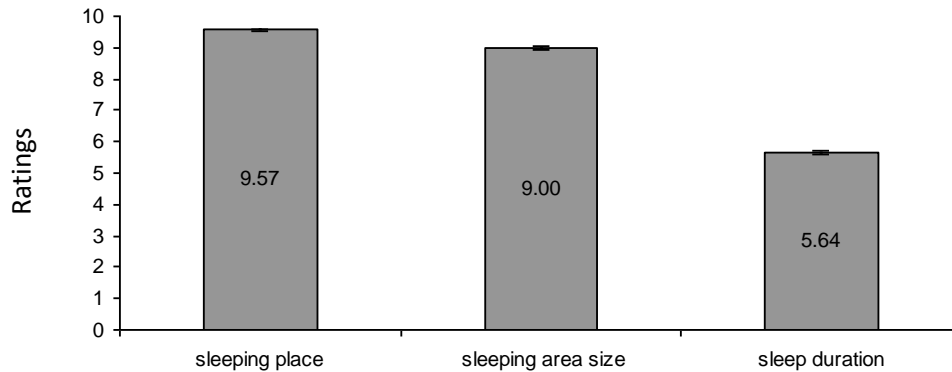
Figure 8: Mean ratings for sleep-related parameter for forest camp elephants of Karnataka

Percentage of mean ratings (Figure 9) for sleep-related parameter dominated for ten values and all values fell within the range of 5 – 10.
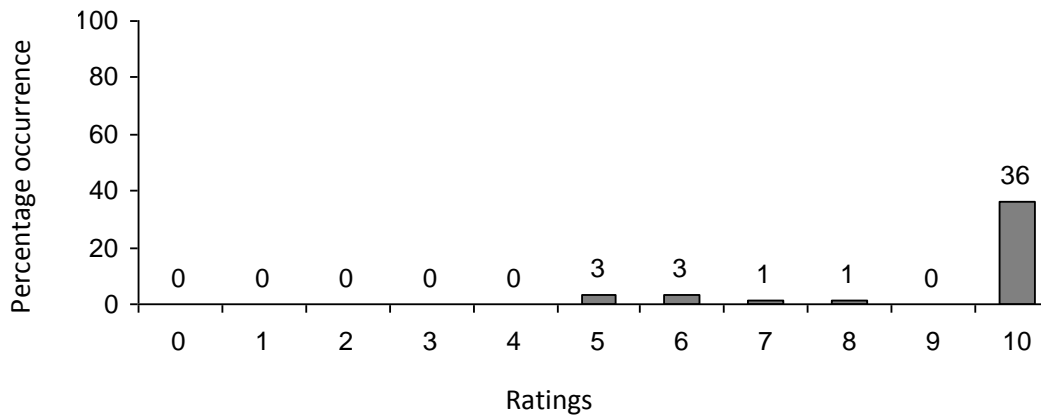
Figure 9: Percentage occurrence of ratings for sleep-related parameters for forest camp elephants of Karnataka

Walk and interaction
The elephants were allowed to walk during various parts of day and night. Mean distance covered while walking was 7.1 km (S.E. = 0.1, N = 50) ranging from 1 km to 27.5 km. Forty per cent of the observed animals walked for < 5 km. Mean duration for walk was 6.0 h (S.E. = 0.1, N = 48) ranging from 0.5 h to 20 h (Maithili, female, 40 yrs). Eighty one percent of the animals were allowed < 12 h of walking (N = 48).

Mean rating for allowing the elephants to walk was 9.91 (S.E. = 0.35, N = 2) showing opportunities to walk for most of the elephants in suitable conditions. Ninety eight percent of the elephants were provided the opportunity to walk. Only one elephant, was not allowed to walk. All the elephants observed were given a rating of 10 for the time of day when allowed to walk (Figure 10).

W: Walk   Wt: Time of walk
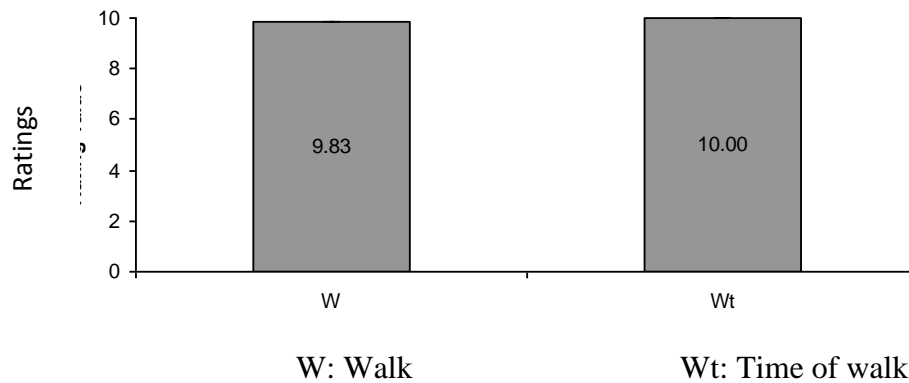
Figure 10: Mean ratings for physical exercise for captive elephants from forest camps of Karnataka.

Interaction with other elephants
Almost all the observed elephants were allowed to interact with other animals in the camp and the exceptions were four adult males. Mean duration for interaction was 20 h (S.E. = 0.04, N = 59) ranging from 0.2 to 24 h. Some elephants, were allowed interaction duration of 0.2 and 2 h, respectively. Twelve percent of the elephants were allowed < 12 h of interaction with other animals. Each elephant was allowed interaction with a mean number of 8.6 individuals (S.E = 0.04, N = 64) ranging from one individual to 20 elephants. Thirty six percent of the elephants were allowed interaction with < 6 individuals (N= 64).

The isolation of captive elephants and lack of opportunity for interaction with others makes it a feature of importance for assessing the welfare status of these social animals as social isolation is associated with stress (Clubb and Mason, 2002). Higher values indicate interaction conditions, in terms of number, age and sex of the animal, distance between elephants and hours of interaction, replicating near-natural conditions. This parameter (interaction) was evaluated using four sub-parameters. Overall mean for interaction was 8.9 (S.E. = 0.23, N = 4) with mean rating ranging from 0 to 10 for individual elephants. Nine per cent of the elephants were given a rating of 0 while 35% were given a rating of 10. Four elephants adult males were given a rating of 0. Ninety per cent of the elephants were given an overall mean rating between 6 and 10.

The mean rating for occurrence of interaction (Figure 11) was 9.1 (S.E. = 0.02, N = 75). The rating occurred as 0 or 10 values only with 91% of the elephants allowed to interact. Mean rating for group size of elephants was 8.4 (S.E. = 0.02, N = 68) with values ranging from 2.5 to 10. Seven elephants, all male, scored a rating of 2.5 due to the occurrence of only males and calves in the group.

In = Occurrence of Interaction with other elephants   InHrs = Hours of interaction
InDs = Interaction distance between elephants   GrSz = Group size of elephants
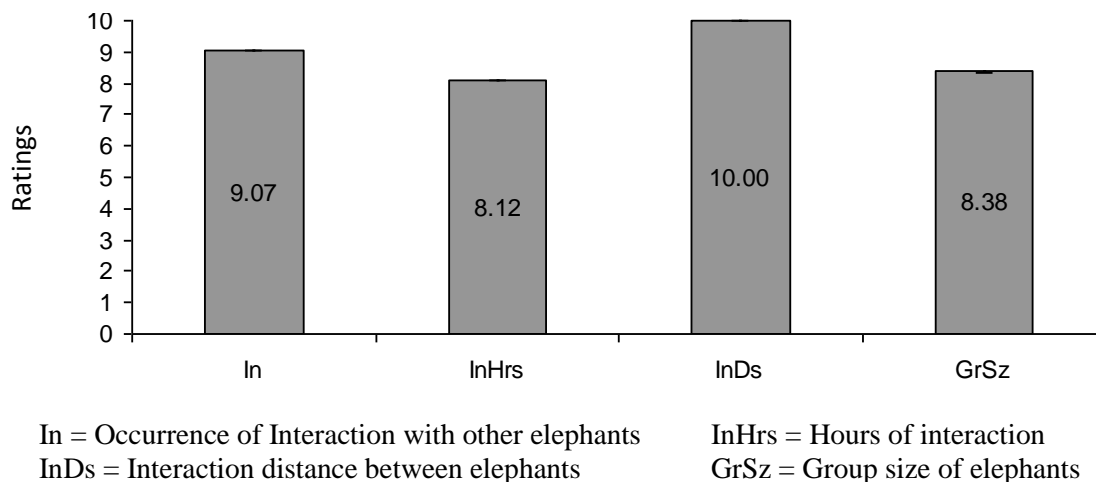
Figure 11: Mean ratings for interaction-related parameters for elephants from forest camps of Karnataka

Percentage occurrence of mean ratings for interaction (Figure 12) among the elephants from forest camps show that about 72% values fall within the range of 9 to 10.
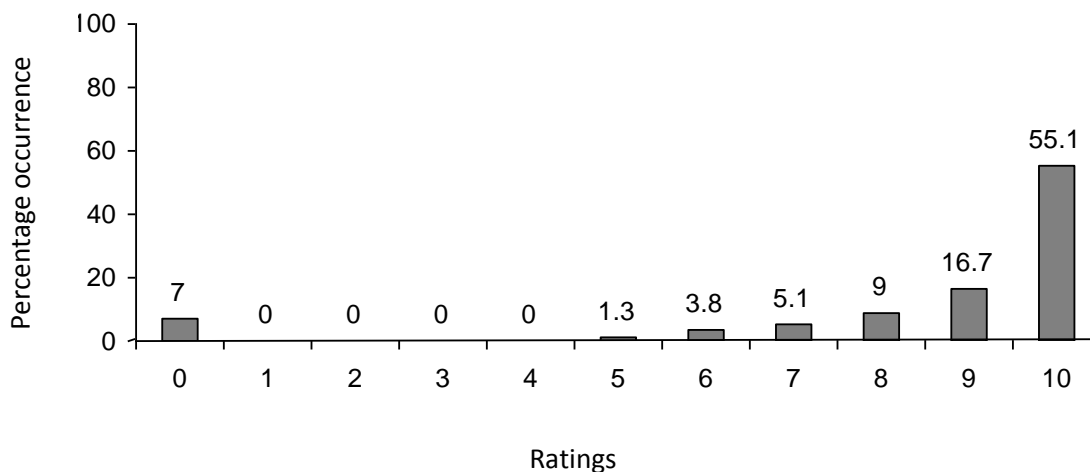
Figure 12: Percentage occurrence of mean ratings for interaction among the elephants from forest camps in Karnataka

Training

The elephants were trained for activities such as logging, safari (carrying tourists) to be a part of the annual Dasara procession or for Kunki purpose. Mean number of commands used to control the elephants was 16 (S.E. =0.05, N = 46) with the number varying from 8 to 30, nine per cent of the animals having to learn < 10 commands.

Observed behaviour

Seventy two percent of the animals were described as calm while 22% were nervous or frightened (N= 60). One elephant, male, 35 yrs old was reported to be rough. Observations recorded for behavioural problems such as being rough towards people or incidents of killing people showed 40% of the elephants exhibited this kind of behaviour (N= 33). Eight elephants

were reported to have killed or injured people. Eighty two per cent of the elephants do not exhibit stereotypic behaviour, however, three adult females and six males showed stereotypy. Maintenance of animals in captive conditions enforces different living conditions for the animals; at times such conditions might be alien to the animal's natural way of life. This results in abnormal behaviour; stereotypy being one such form and is used to assess the quality of a captive animal's life.

Behaviour was assessed using four sub-parameters. Overall mean rating for behaviour-related parameters (Figure 13) was 6.64 (S.E. = 0.5, N = 4) with values ranging from 0 to10 for individual elephants. One male, 14 yrs, was given an overall rating of 0 as the animal gets easily frightened, disobedient and aggressive.

B: Observed behaviour   AgB: Aggressive behaviour
StB: Stereotypic Behaviour   InStB: Intensity of stereotypic behaviour

Figure 13: Mean ratings for elephant behaviour in forest camps of Karnataka

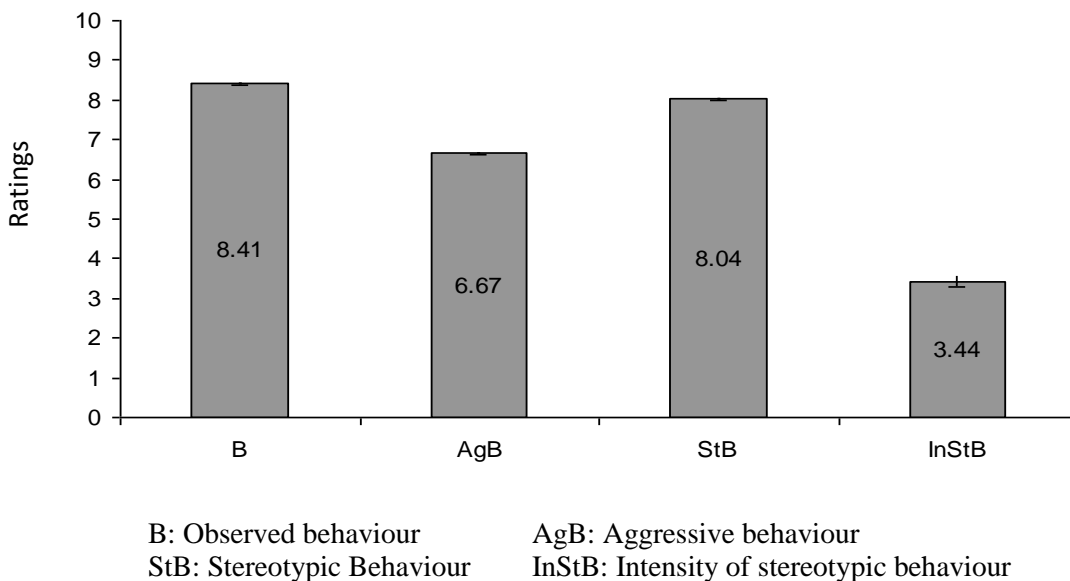Percentage occurrence of mean ratings of forest camp elephants for behaviour show (Figure 14) about 60% values fall under 10
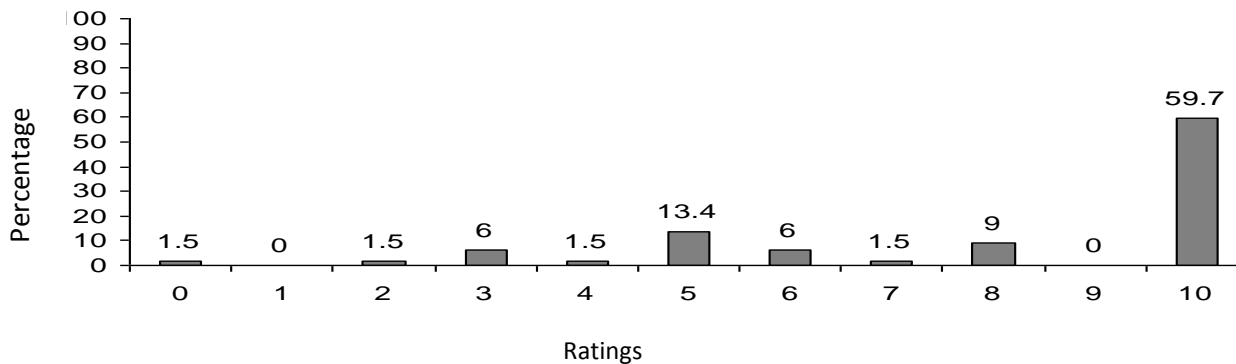

Figure 14: Percentage occurrence of mean ratings for behaviour of forest camp elephants in Karnataka

Mean rating for the general behaviour expressed by the elephant was 8.4 (S.E = 0.03, N = 64). Ratings of more than 7.5 show calm/docile/quiet disposition of the animal. Seventy per cent of the elephants were described as calm/docile. Mean rating for this parameter was 6.7 (S.E. = 0.1, N = 39) with scores falling in only two categories: zero or ten representing presence/absence of aggressive behaviour towards people. Sixty seven per cent of the animals did not show any aggressive/rough behaviour. Except one, all the elephants reported aggressive were males. Thirty being one per cent of the elephants that had been captured from the wild due to their aggressive behaviour towards people continued to be aggressive after capture. Absence of stereotypy was given a rating of 10 while its occurrence scored 0. Mean rating was 8.04 (S.E. =0.04, N = 51) with 80% of the elephants not showing stereotypic behaviour.

Chaining

Mean duration for which the animals were chained was 9.6 h (S.E. = 0.12, N = 26) with duration ranging from 0 to 24 h. The elephants were allowed to free range for a mean duration of 12.5 h (S.E. = 0.2, N = 14). Mean weight of chain used in tying the animal's legs was 35.8 kg (S.E. = 0.11, N = 39). Mean chain length (on legs) was 8.4 m (S.E. =0.62, N = 38). The number of animals observed with different categories of chaining is given in Figure 15, most of the animals observed fall in the category of free ranging with drag chain, number of animals seen with drag chain and cuffs/hobbled also contributed in a major proportion
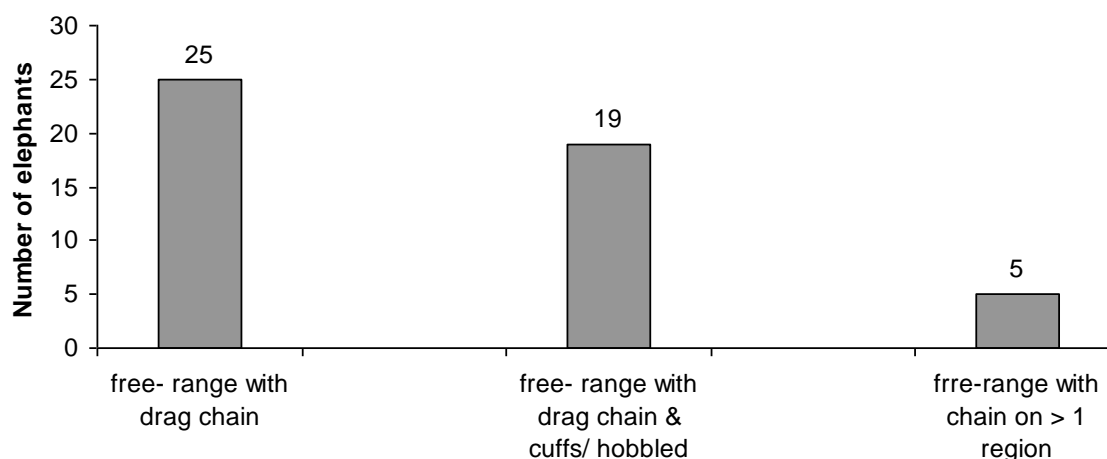
Figure 15: Number of elephants observed with different categories of chain types in forest camps of Karnataka.

An attribute characteristic of captive elephants is the use of chains for a variety of reasons leading to restricted movement of the animal. Chain-related variables were assessed over five sub-parameters (Figure 16), with high scores indicating near-ideal conditions of free ranging opportunity for the animal. Overall mean for chaining was 2.96 (SE. = 0.5, N = 5) with values ranging from 0 to 10 for individual elephants and eight elephants were given an overall rating of 0 implying lack of free-ranging conditions and chaining in more than one region of the body.
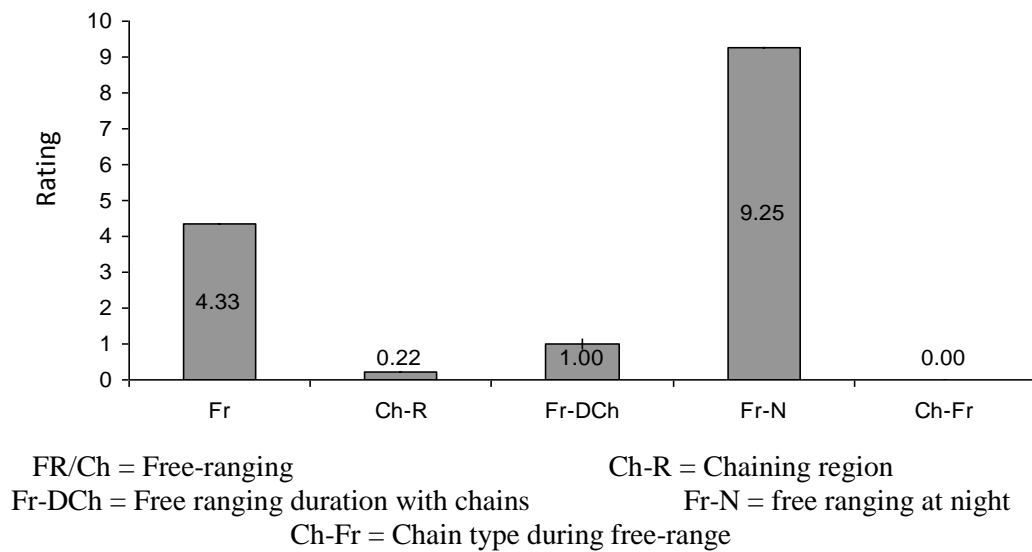
Figure 16: Mean ratings for chain related parameters for forest camp elephants of Karnataka

The elephants were rated for being allowed to range free under natural conditions. Mean value for this feature was 4.3 (SE = 0.04, N = 60). Scores for this variable occurred in two types only: 0 or 10. The opportunity to range free at night was assessed. Mean value was 9.3 (SE = 0.03, N = 53). Here too, the scores fell into two extreme categories of 0 and 10. The opportunity to range free for a captive animal is usually curtailed by the use of chains, tied to it to restrict its movement. These chains are tied around the animal and are then left to range free. Mean value of 0 (SE = 0, N = 24) indicates the use of hobbling or tying two legs with a chain.

Percentage occurrence of mean ratings for chaining for elephants in forest camps show (Figure 17), ratings of which 3, 5 and 10 dominate and a large proportion of values fall below 5, suggesting the parameter could give negative welfare value for elephants in forest camps.

Figure 17: Percentage occurrence of mean ratings for chaining for elephants in forest camps n Karnataka

Nature of work

Work type varied: carrying tourists for safari, logging, patrolling, as Kunki, supplying rations to anti-poaching camps or being a part of the annual Dasara procession. Of the 47 elephants observed, 38.3% were used for tourist-related activity. Ninet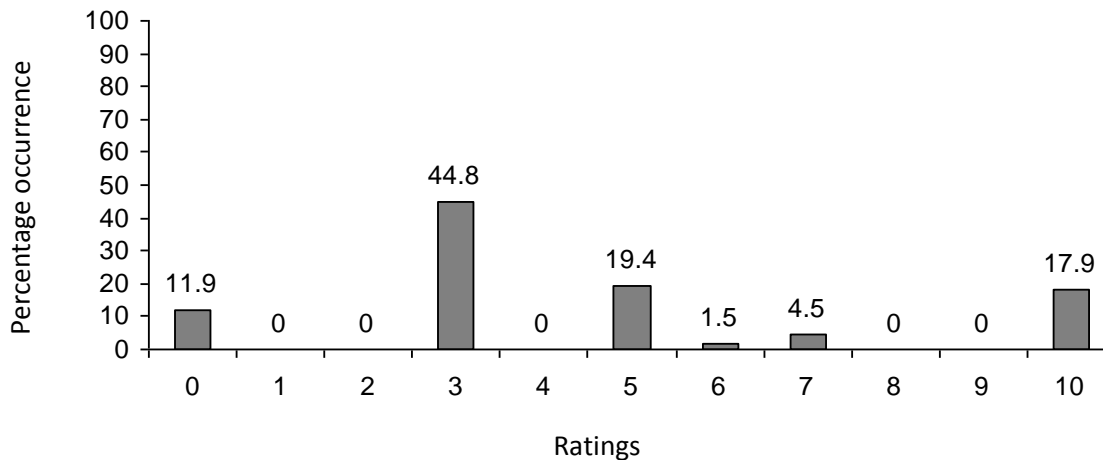een percent of the animals were not given any work. Mean work duration was 3.3 h (SE = 0.1, N = 21) ranging from 0 to 5 hours. Eighty one per cent of the elephants were made to work between 2 and 5 hours. Mean age when the animal first began to work was 13 yrs (SE =0.22, N = 16) with age ranging from 3 to 35 yrs. The mean maximum weight carried by the elephants was 419.24 kg (SE = 0.73, N = 23) ranging from 75 kg to 1200 kg. Mean distance over which the weight was carried was 2.4 km (SE = 0.11, N = 21). Average weight carried when elephants were used for rides was 384.52 kg (SE = 0.6, N = 21) with weights ranging 175–770 kg. Mean number of rides per day was 8.42 (SE = 0.2, N = 13).

Captive elephants are made to work, usually of a kind that is alien to their natural behaviour. Ratings were given in comparison with the nature of work that replicated the animal's natural behaviour in the wild. Work type such as patrolling in forests was given higher rating values than those which subjected the animal to perform such tasks as standing for hours in one place or raising itself on its hind legs, etc. Mean rating for work related parameter was 5.2 (SE = 0.04, N = 43) with values ranging from 0.625 to 10. Thirty per cent of the animals were given a rating less than 3 (Figure 18) implying unsuitable work type while 19% were given a rating of 10 showing the use of the animals in suitable work type.
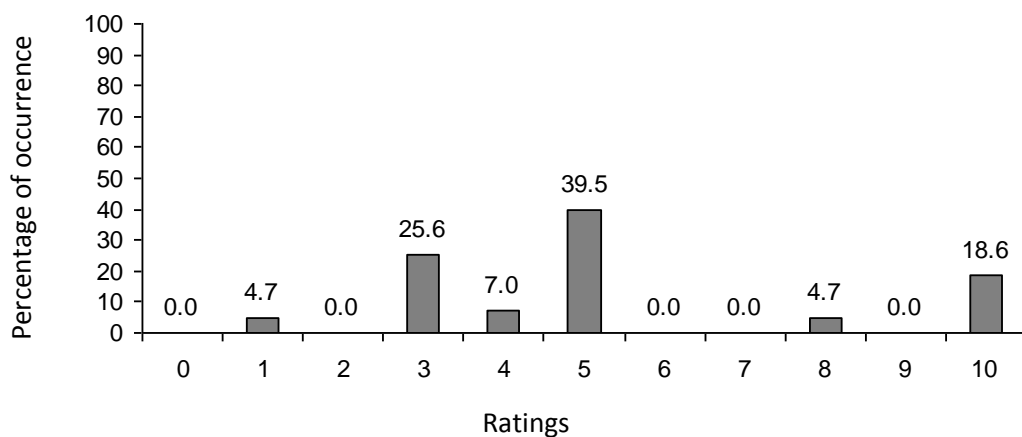
Figure 18: Percentage occurrence of mean ratings for work for captive elephants of forest camps of Karnataka.

Provision of food

Seventy eight per cent of the elephants were provided both stall-feeding and allowed to range free (N= 51). Among the food provided, jaggery (raw concentrate of sugarcane juice) was the most common (Figure 19) followed by ragi (*Eleusine* sp.), Sixty six per cent of the places reported using a ration chart for feeding the elephants (N= 38).

R = Rice (Kgs)   Rg = Ragi (Kg)   S = Sugarcane (kg)
Hg = Horsegram/Greengram (kg)   J = Jaggery (Kg)   Cc = Coconut (number)
St = Paddy straw/ hay/ grass (kg)   Sl = Salt (Gms)
Ot = Others (Banyan leaves, Banana, Gevin Beru, Carrots) in kg
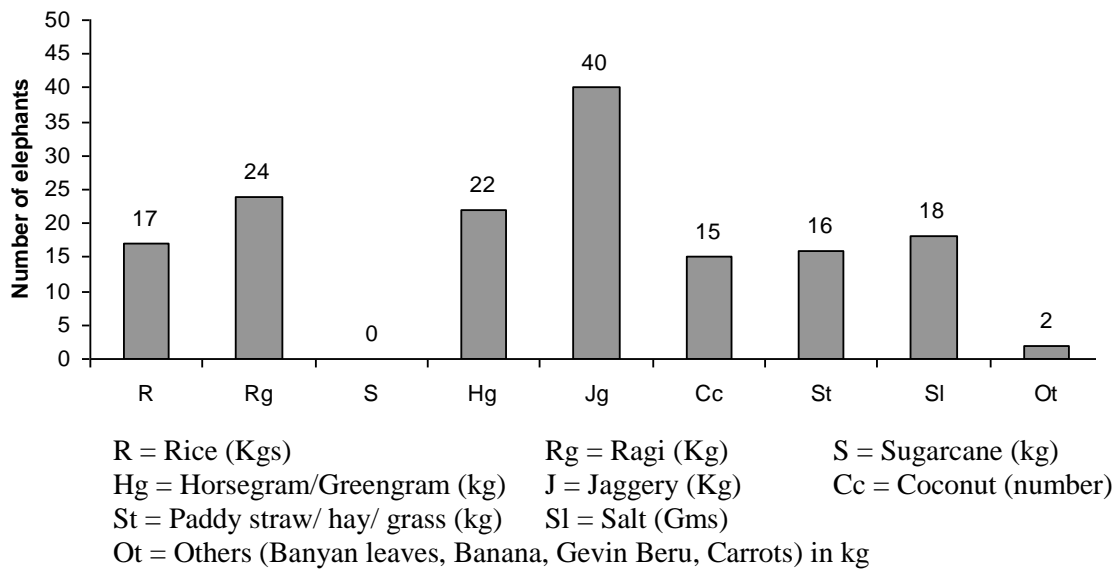
Figure 19: Type of food items given to captive elephants in forest camps of Karnataka

Wild elephants are considered generalist feeders, eating a range of plant species (Sukumar, 1991). Providing only stall feed may be inadequate in terms of the range, and also absence of learning opportunity for young animals to learn to feed on different plants. The parameter (food) was measured using four sub-parameters (Figure 20) which included the method of feeding (stall-fed or allowed to free range in natural conditions), number of food items, usage of a ration chart, etc. Overall mean rating was 6.9 (SE = 0.43, N = 5) with values ranging from 0.38 to10.
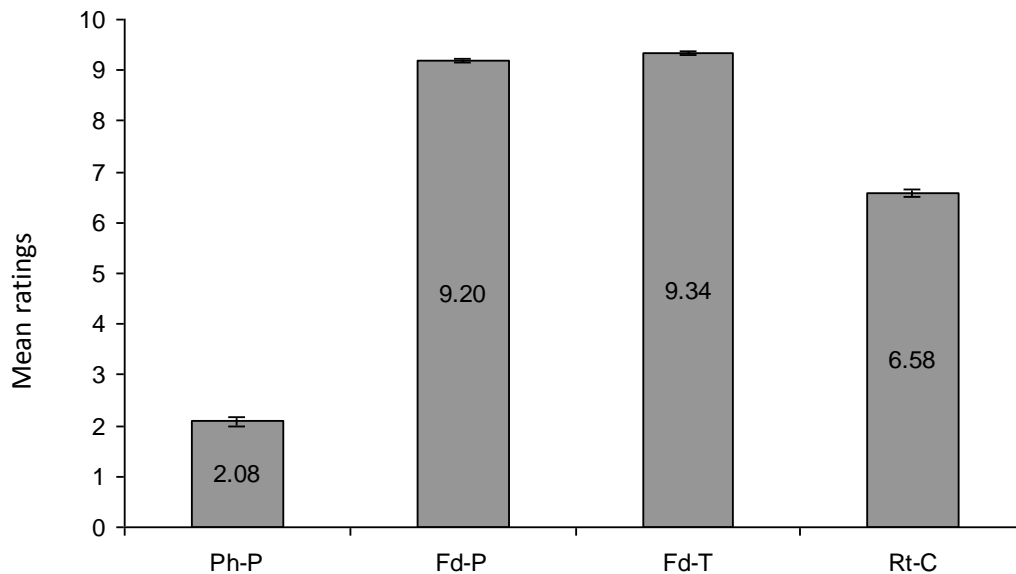
Ph-P: Alteration of food during physiological changes   Fd-P: Type of food provisioning
Fd-T: Food types (number)   Rt-C: Usage of ration chart

Figure 20: Mean ratings for food related parameters for captive elephants from forest camps of Karnataka

Percentage occurrence of mean ratings for food-related parameter for forest camps show that 54% ratings fall in the value of 10 (Figure 21) and there is a gradual increase in the percentage of values from 5 to 8.

Figure 21: Percentage occurrence of mean ratings for food related parameter for forest camps in Karnataka.

Higher rating was given for elephants which were provided stall feeding and allowed to range free for food. Mean rating was 9.2 (SE = 0.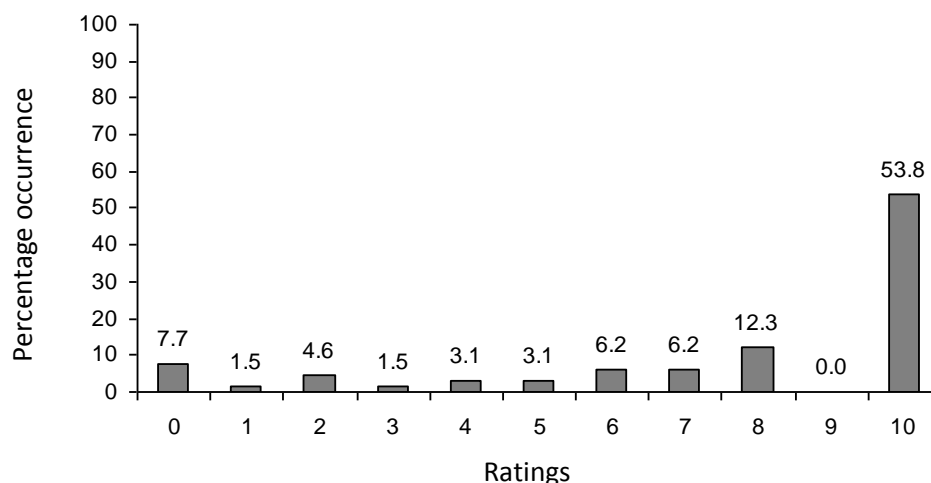03, N= 50) with values in two categories only: 0 or 10. The rating shows higher incidence of provision of both types of feed. Food which included supplementation of natural feeding by the animal with stall feeding was given higher rating. Mean rating was 9.3 (SE = 0.03, N = 49). Provision of different kinds of food during physiological changes shows increased care of the animal. Mean rating was 2.1 (SE = 0.1, N = 24) with 80% of the animals not being provided any special food during physiological changes.

Reproductive status female
Reproductive status of the female elephant was assessed by collecting information on such variables as: whether the elephant was cycling or not, opportunity to mate, number of times pregnant, etc. Among the sampled female elephants, eleven were said to be cycling while three were not. One sixty yrs old female was the only animal >10 yrs of age which was not cycling. There were 10 elephants whose age was less than ten years. All the elephants which were said to be cycling were exposed to male animals. For the elephants allowed to mate, the male source was captive elephants for six animals, captive and wild for five and wild male for three animals. The mean number of birth of calves was 2.9 (SE =0.14, N = 15), and the ratio of male: female calves born varied from 1: 0 to 1: 3. The mean age of elephants at first birth was 30.83yrs (SE = 0.7, N = 6). Mean calving interval was 4.53 yrs (SE = 0.2 N = 8) ranging from 3.5 to 6 years. Reproductive status was measured over seven parameters (Figure 22). Overall mean for female reproductive status was 8.44 (SE = 0.20, N = 7) with mean values for individual elephants ranging from 0 to 10.

Cy: Cycling status   Ex-M: Exposure to male
Ob-M: Observation of mating   M-S: Male source
C- Pr: Presence of cows   Cl- N: No.of calves born
Cl-I: Calving interval
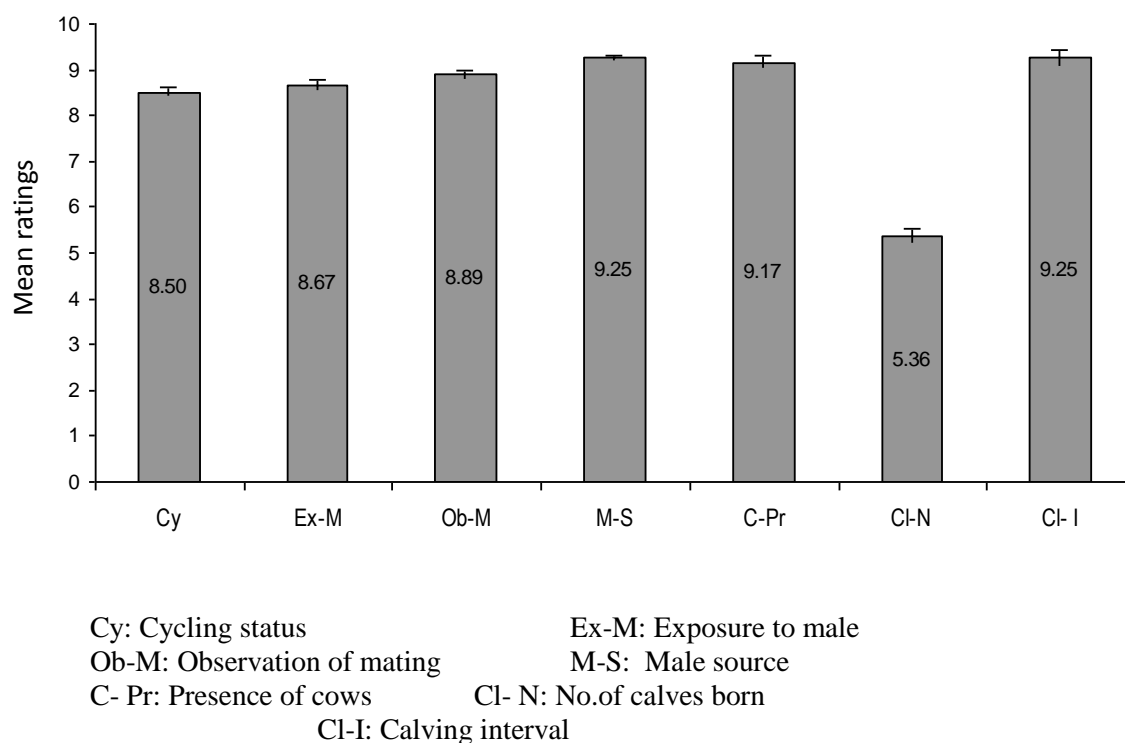
Figure 22: Mean ratings for reproductive status of elephants in forest camps of Karnataka

The results of the percentage occurrence of mean ratings for reproductive status show that 89% of the individual ratings ranged from 7.3 to 10 (Figure 23).
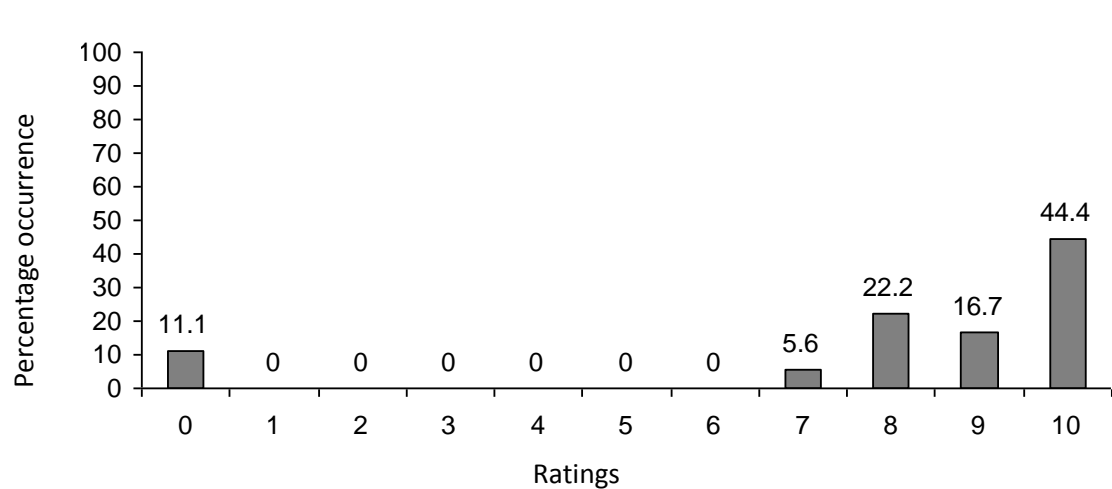
Figure 23: Percentage occurrence of mean ratings for reproductive status of elephants in forest camps of Karnataka

Mean rating for occurrence of heat cycles among the elephants was 8.5 (SE = 0.1, N = 20). This parameter was rated on a 10 and 0 scale only denoting "yes-no" category. Eighty five per cent of the ratings belonged to the "yes" group with a score of 10. Captive female elephants with access to both wild and captive males were given a higher rating. Mean rating was 9.54 (SE = 0.1, N =

13) with twenty three per cent of the elephants reported to have mated with captive males only and the rest with both wild and captive males. Two females were reported to have mated with captive males only. The elephants have been rated by considering their age along with number of births given. Higher rating indicates appropriate number of births within the prescribed age. Mean rating was 5.4 (SE = 0.2, N = 11) with values ranging from 2 to 10. Fifty five per cent of the observed elephants scored less than 5 (between 2 and 4) indicating fewer births. The presence of other female elephants while the pregnant mother delivers has been scored, as it forms an important feature of their natural behaviour. Mean rating was 9.2 (SE = 0.15, N = 12) with values occurring in only one of two categories: Yes = 10 and No = 0. Ninety two per cent of pregnant elephants gave birth in the presence of cows. The only elephant not to have other cows present was of a female 51 yrs.

Male
Male elephants were assessed for reproductive status by rating several sub-parameters (Figure 24) such as reproductively active/not, occurrence of musth, exposure to females, etc. Eighty one per cent of the male elephants observed were reproductively active (N= 21). Musth occurrence was reported in 22 elephants across different months of the year. Eighty six per cent of the elephants in Musth were aggressive/ violent in various degrees. Most used method of controlling elephants in Musth was isolation and chaining (N = 16). Overall mean rating was 5.92 (SE = 0.4, N = ... above 20 year ...

Rp-A: Reproductively active/ not   Mu-O: Musth occurrence
Ex-F: Exposure to females   Be-Mu: Behavioural problems during Musth
Hd-Mu: Handling of Musth elephants   Po-Mu: Post Musth problems
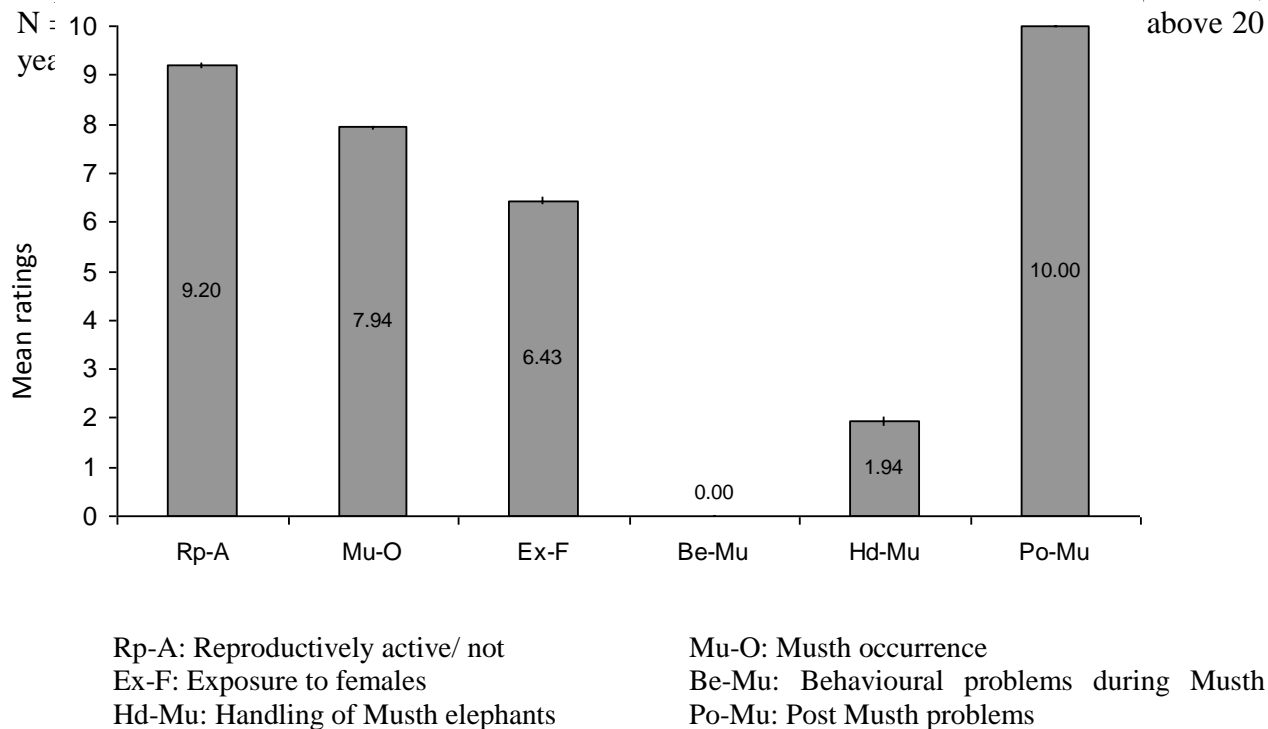
Figure 24: Mean ratings for male reproductive status in forest camps of Karnataka

Mean rating was 9.2 (SE= 0.1, N = 25) indicating near-ideal occurrence of reproductively active males. The rating occurred in only one of two categories (Yes = 10, No = 0) with 92% of the observed elephants reported to be reproductively active. Elephants reported to have exhibited musth signs were given a rating of 10. Mean rating was 7.94 (SE = 0.06, N = 34) with seventy nine per cent occurrence of musth among the observed elephants.

Elephants exposed to females were given a higher rating. Mean rating was 6.52 (SE = 0.1, N = 23) with thirty five per cent elephants not exposed to females. Behavioral changes in an elephant during Musth make management of the animal a challenging task. Higher values indicate provision of natural conditions for the animal while low scores denote isolation, chaining or other unnatural conditions. Mean rating was 1.94 (SE = 0.11, N = 18) with seventy eight per cent of elephants in Musth reported to be isolated or chained and three elephants were left free during musth.

Health status
The health of a captive animal assumes greater importance when its correlation with captive conditions is considered. Poor captive conditions, both physical and/or social, may result in ill health among animals. Twenty three elephants were said to have suffered from disease/injury. Stomach related problems such as diarrhoea were common (N = 9). Foot injury was reported in nine of the observed elephants. Ninety five per cent of the observed elephants have been de-wormed at least once (N = 65). Mean number of times each animal was de-wormed was 8.9 (SE = 0.05, N = 54) with allopathic or local medicines.

Forty three per cent of the animals have been vaccinated against different diseases at least once (N = 60). Oiling was done for 99% of the animals (N = 74) in the head, leg, and neck or ear region. The oils used were either castor or neem oil. Tests of blood/urine/dung samples were done for 18% of the animals (N = 45). Health status was assessed by rating 13 sub-parameters (Figure 25) such as disease/injury, frequency, nature, adherence to prescribed veterinary schedule, etc. Overall mean for health status was 6.64 (SE = 0.16, N = 13) with mean rating for individual elephants ranging from 0.25 to 10.

D/I-Oc: Disease/injury occurrence   Fq-Oc: Frequency of occurrence
Hs: Health status   Dw: De-worming status
Fq-Dw: Frequency of de-worming   Vc: Vaccination status
Fq-Vc: Frequency of vaccination   Ol: Oiling status
Fq-Ol: Frequency of oiling   S-T: blood/urine/dung sample tests
Fq-T: Frequency of such tests   Bd: Body measurements taken
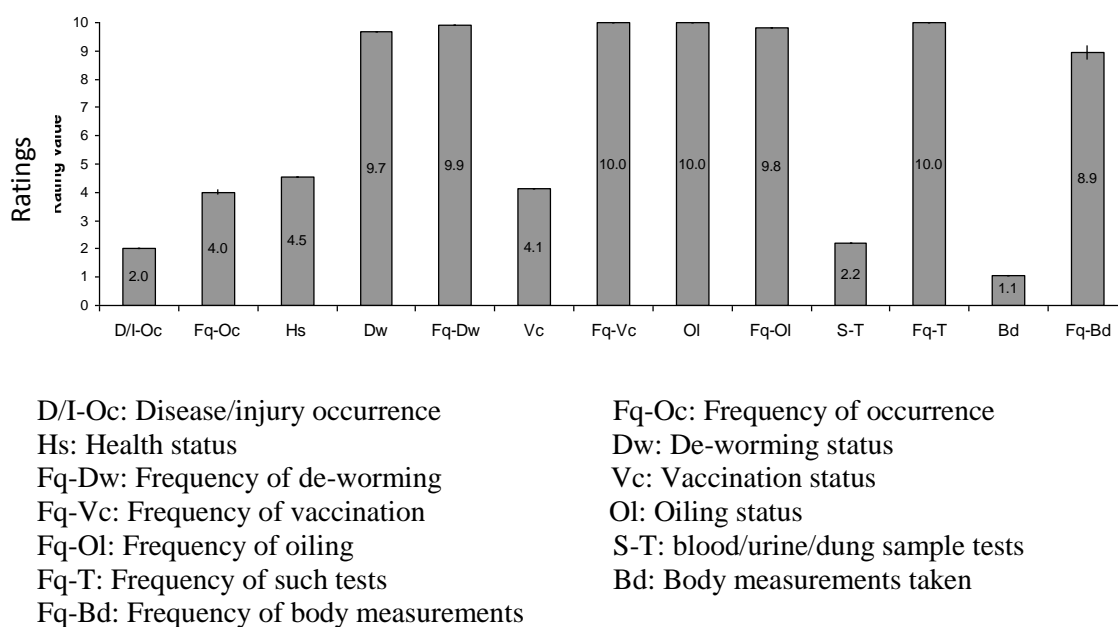Fq-Bd: Frequency of body measurements

Figure 25: Mean ratings for health related parameters for captive elephants of forest camps in Karnataka

Percentage occurrence of mean ratings for health status of elephants in forest camps show that about 71% of the values fall within 6 to 10 (Figure 26).
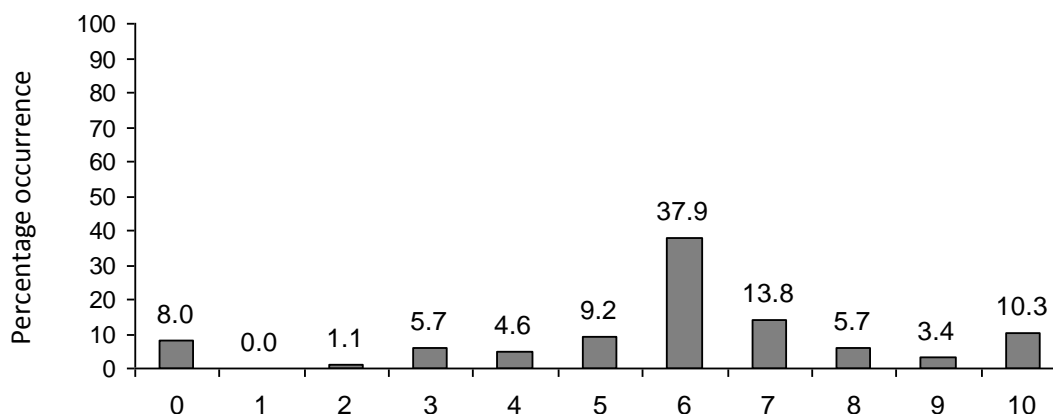

Figure 26: Percentage occurrence of mean ratings for health status of elephants in forest camps of Karnataka

Ratings highlight the importance of disease occurrence as the maximum value assigned for lower frequency of occurrence is 8 and not 10. Mean rating for this sub-parameter was 4.0 (SE = 0.12, N = 20). Fifty per cent of the ratings were given a score of 8 indicating lower frequency of occurrence; the remaining 50% were given a score of 0 and four elephants were given a rating of zero. Disease/injury type was rated based on whether it could lead to further health problems, whether it was amenable to treatment or caused distress to the animal. When an animal has a disease or injury of chronic nature that cannot be treated, causes pain to the animal, leading to other health problems, it is given a rating of 0. Maximum value of 8 is given to an animal with a disease or injury without any of the above-mentioned features. Mean rating was 4.5 (SE = 0.05, N = 40) with values ranging from 0 to 8. Fifty five per cent were given a rating value less than 3 implying very poor disease/injury status for these animals.

Testing of the excreta or blood samples of the animal was given a high rating as this forms a database of information on the health and physiological condition. Mean rating was 2.22 (SE = 0.05, N = 45) with 78% of the values being 0 indicating that no tests had been conducted. Routine body measurements of the animal are important as they reflect on the health condition of the animal in addition to providing information on maintenance of ideal weight. Mean rating was 1.5 (SE = 0.03, N = 57) with 89% of the values being 0 showing that body measurements were not taken.

Veterinary care and facilities
Availability of veterinary care and facilities are of utmost importance for the welfare of a captive animal. Veterinary doctors were available for all the animals observed (N = 59) with 98% of the doctors having experience in treating elephants. Daily/weekly visits were the highest (66.7%, N= 45) followed by monthly visits. The mean distance from location of camp to doctor's place was 95.7 km for situations where the doctor was on call. Eighty six per cent of the camps had the service of a veterinary assistant (N= 28).

Infrastructure

Staff quarters were available at 29 of the locations surveyed (N = 31) with nearly 40% said to be in a bad condition (N= 28). The other facilities and their status have been given in the Figure 27.

Qtr = Staff quarters available   Ck-Sd = Cooking shed   Ck-Vs = Cooking vessels
Pr-Sd = Provision shed Kr = Kraals   An–St = Animal stand
Cp-St = Camp site   M = Manager   Ck = Cook
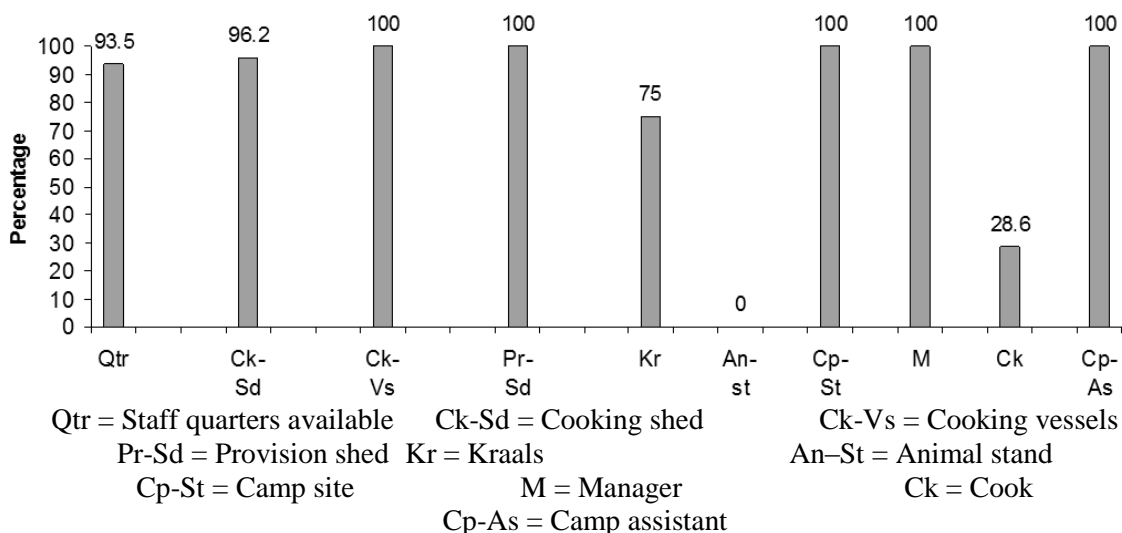Cp-As = Camp assistant

Figure 27: Type of facilities available at forests camps of Karnataka.

The funds required annually for maintaining an animal was said to be between Rs. 40,000 and Rs 4, 00,000. Of the four observations, three reported problems were associated with funds. This parameter (veterinary care and infrastructure) was assessed using eight sub-parameters (Figure 28) such as availability of veterinary doctor, doctor's experience with elephants, years of experience, availability of veterinary assistant, etc. Overall mean rating was 8.56 (SE = 0.19, N = 8) with ratings for individual elephants ranging from 6.8 to 10.

D: Availability of Vet. Doctor   Ex-E: Vet.'s elephant experience   Ex: Vet's years of experience
Fq: Freq. of Vet's visits V-As: Availability of Vet. Assistant   V-Cl: Vet. Clinic availability
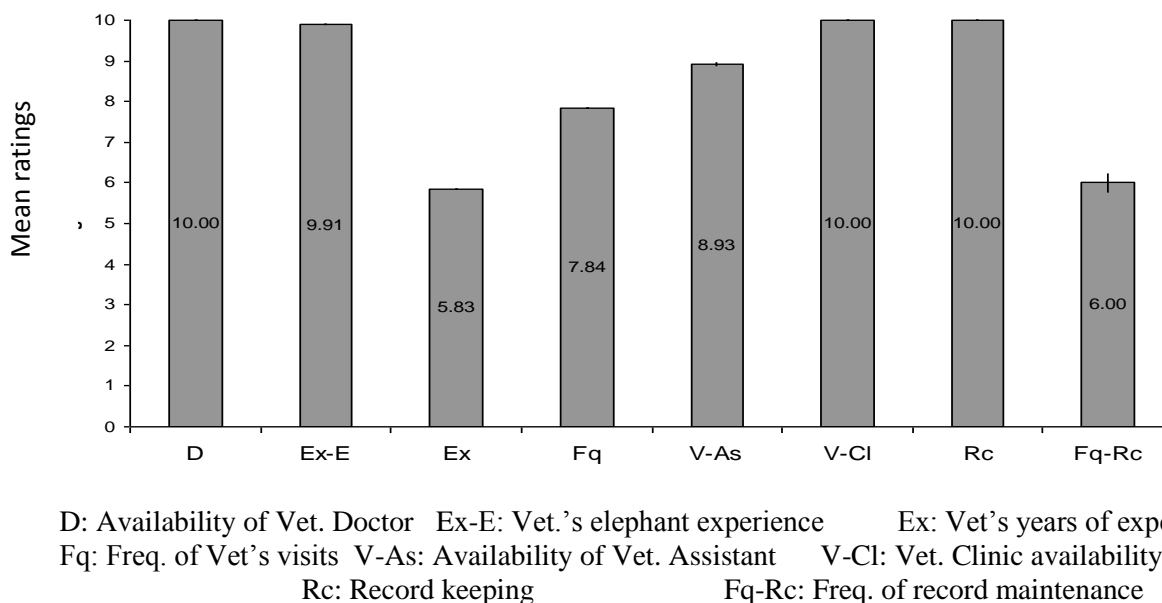Rc: Record keeping   Fq-Rc: Freq. of record maintenance

Figure 28: Mean ratings for veterinary care and facilities in forest camps of Karnataka

Mean rating was 10 (SE = 0, N = 59) indicating veterinary doctor's availability for all observed elephants. Mean rating for doctor's experience with elephants was 9.90 (SE = 0.01, N = 53) with 98% of the doctors having experience in treating elephants. Mean rating was 5.83 (SE = 0.03, N = 36) with 89% of the veterinary doctors getting a score between 6 and 8.

Mahout/cawadi welfare status and work experience

Average age of mahout was 43 yrs (SE = 0.5, N = 55) while it was 32.2 yrs (SE = 0.1, N = 43) for cawadi. Mean experience as a mahout was 16.3 yrs (SE = 0.1, N = 51) and for cawadi was 10.4 yrs (SE = 0.1, N = 42). Mean experience with the elephant a cawadi was currently handling was 6.2 yrs (SE = 0.1,N = 43). Only two of the mahouts expressed interest in being a mahout and hence preferred to join the profession (Figure 29). Only one cawadi mentioned that liking of work was the reason for choosing the profession.

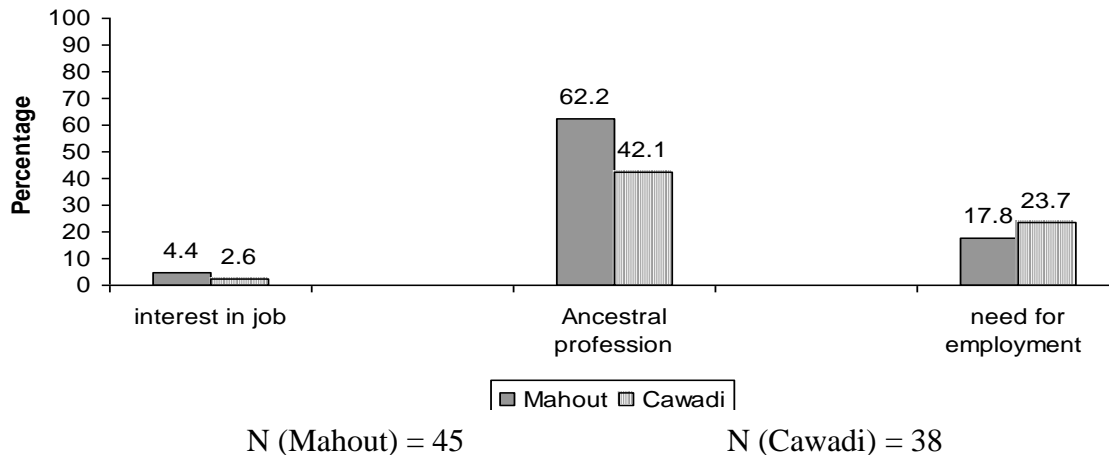N (Mahout) = 45   N (Cawadi) = 38

Figure 29: Reasons for becoming mahouts/cawadi in forest camps of Karnataka

All the mahouts/cawadis belonged to tribal/Muslim community of all the handlers interviewed. Sixty three per cent of mahouts (N = 49) and 47% (N = 38) cawadis have received training. Education level (Figure 30) was assessed. The criterion here were to look for people who had attended school, irrespective of their extent of literacy.
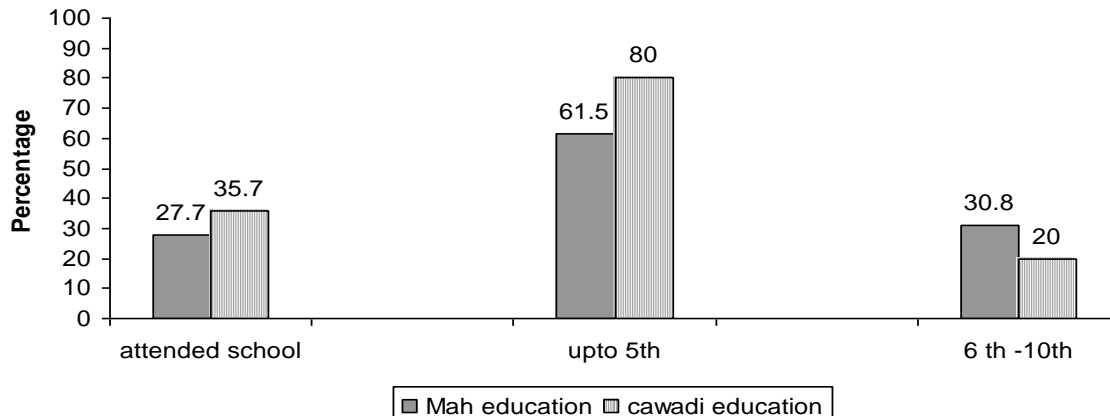

Figure 30: Educational status of mahout and cawadi in forest camps of Karnataka.

Mean annual salary (Figure 31) for mahout was Rs.58, 645/- (SE= 3.3, N = 50), for cawadi the mean annual salary was Rs. 31,746/- (SE = 3.3, N = 35).
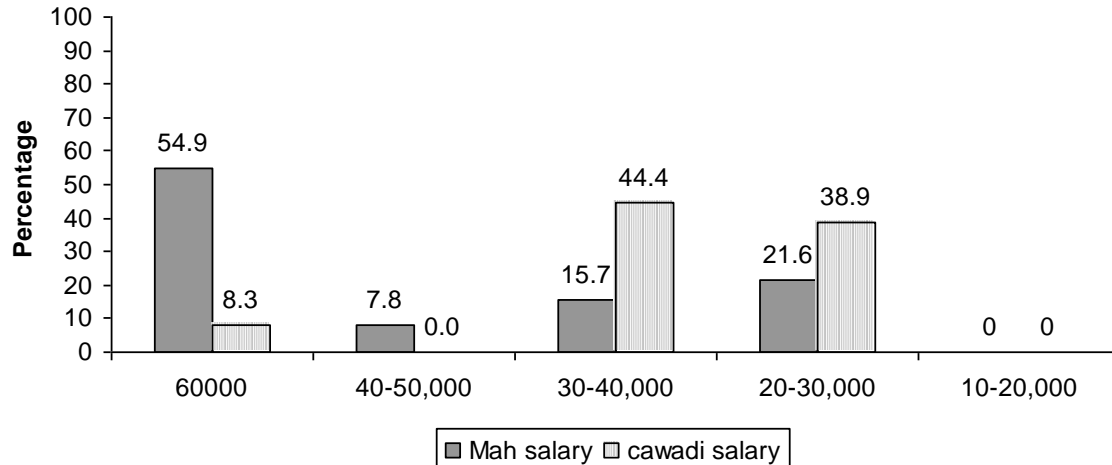

Figure 31: Mahout and cawadi salary status in forest camps of Karnataka

Sixty percent of the mahouts had permanent jobs (N= 50) and the same for cawadis was 18% (N= 39). Ninety six per cent of the mahouts were married (N = 51) with a mean number of 2.7 children (SE = 0.03, N = 48). Eighty nine per cent of the cawadis were married (N= 37) with a mean number of 2.1 children (SE = 0.04, N = 29). Eighty four per cent of mahouts had access to accommodation (N= 51, Figure 32), while the same was 76% for cawadis (N= 37).
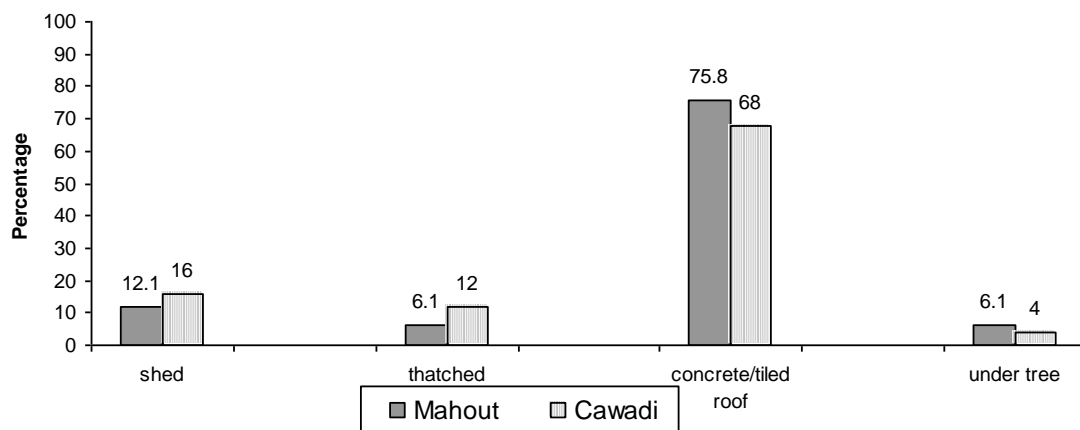

Figure 32: Accommodation types for mahouts and cawadi in forest camps of Karnataka

Ninety six per cent of the mahouts were said to use tools (Figure 33) to control their elephants (N= 47), while it was 100% among cawadis (N= 28).
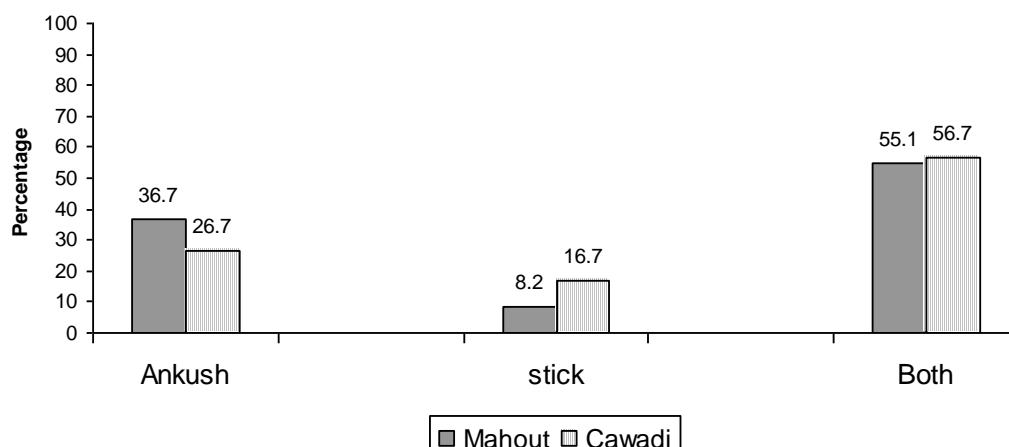
Figure 33: Type of tools used by mahouts and cawadi to control elephants in forest camps of Karnataka.

Welfare of the elephant is indirectly affected by the welfare of its handlers, the mahout and the cawadi. Hence, their socio-economic conditions were recorded and rated. Also, aspects such as experience as a mahout, whether trained or not, etc. were rated. The ratings were on a scale of 0 to 10, with 0 representing adverse conditions and 10 best possible status for the mahout/cawadi. For example, if a mahout/cawadi's salary is more than or equal to Rs.60, 000/- per year, he gets a rating of 10. The rating reduces as the salary decreases with a wage of Rs.10, 000 to 20,000/- per year getting a rating of 2. Welfare status and work experience of mahout and cawadi were assessed across 17 parameters (Figure 34) each.
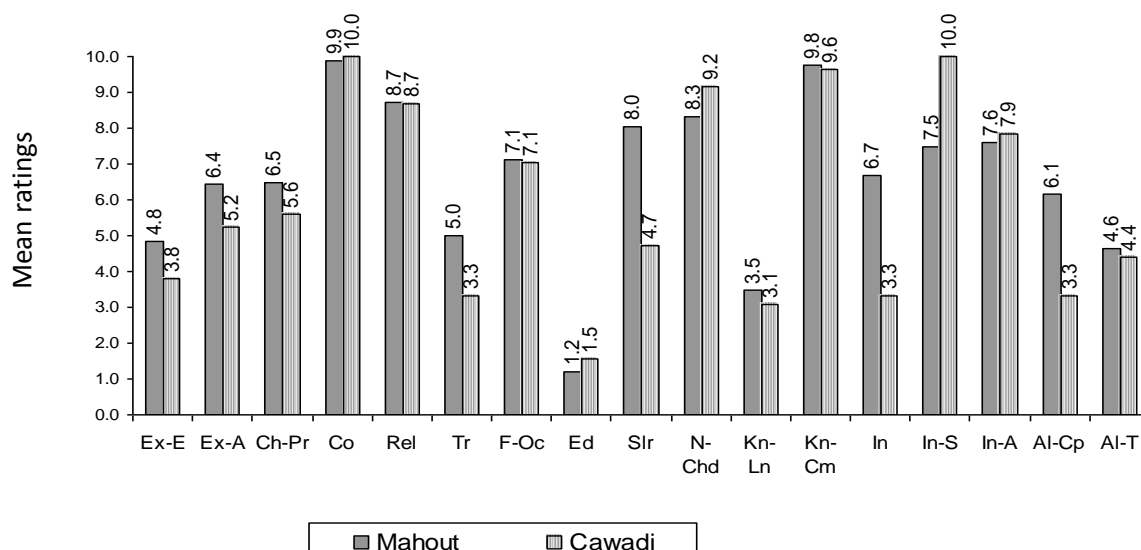
Ex-E = Experience as % of elephant's age   Ex-A = Experience as % of age
Ch-Pr = Reason for choosing this profession   Co = Community of mahout/cawadi
Rel = Having mahout/cawadi as relatives   Tr = Trained as mahout/cawadi
F-Oc = Family occupation   Ed = Education
Slr = Salary   N Chd = No. of children
Kn-L= Languages known   Kn-Cm = Knowledge of commands
In = Insurance done   In-A =Amount insured for
Al-Cp = Consuming alcohol   Al-T= Timings of consumption

Figure 34: Mean ratings for mahout and cawadi welfare parameters

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Overall mean ratings (Figure 35) for mahout was 6.58 (SE = 0.09, N = 17) and for Cawadi 5.93 (SE = 0.1, N = 17).
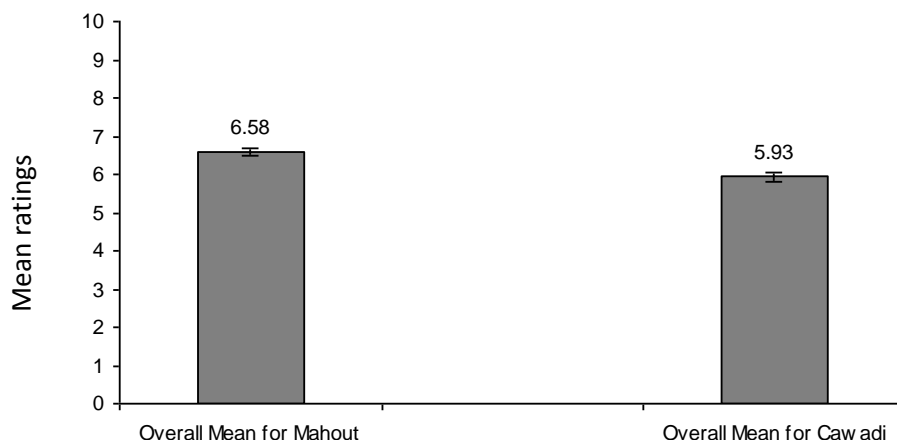

Figure 35: Overall mean ratings for mahout and cawadi in forest camps of Karnataka

Experience as a mahout/cawadi which accounts for > 50% of one's age indicates longer duration spent in this profession. Hence, it is given a score of 10. Lesser percentages are given lower ratings. Mean rating for mahout was 6.43 (SE = 0.04, N = 49); for cawadi it was 5.23 (SE = 0.05, N = 39). The more time a mahout/cawadi spends with his elephant, the more he will know about the animal's idiosyncrasies, this being true for the elephant also in relation to the mahout/cawadi's behaviour. Mean rating for this parameter for mahout was 5.85 (SE = 0.05, N = 44) ranging from 0 to10. Thirty-four per cent of values were given a rating of 10 and 38% were less than 3. For cawadi, the mean was 4.0 (SE = 0.06, N = 34) ranging from 0 to10. Fifty nine percent of the cawadis were given a rating less than 3 for experience with the particular animal.

As the profession of handling elephants has a long historical tradition with generations of a family practicing it, family occupation was rated for each mahout/cawadi. High rating scores were given for mahout/cawadi's families which practiced the same profession. The mean rating for mahout was 7.11 (SE = 0.05, N = 45), for cawadi it was 7.1 (SE = 0.07, N = 34). Wages determine the ability of a person to maintain a household. Deficiency in meeting the family's requirements may be expressed in ways that may affect work performance. Wages were scored such that an income that equaled or exceeded Rs.5000/- per month was rated as good. Mean rating was 8.04 (SE = 0.03, N = 50) with 58% of mahouts getting a score of 10 and 20% getting four; for cawadi, the mean was 4.72 (SE = 0.04, N = 36) with 86% getting score of 4 and only 11% scored 10.

Handling elephants can be dangerous for the mahout/cawadi as unforeseen situations may result in injury or death of the handler when the animal becomes uncontrollable. In this context, insurance cover for the person provides a degree of security for the mahout/cawadi's family. Mean rating for mahout was 6.7 (SE = 0.05, N = 48) with 67% having insurance coverage. For cawadi, the mean was 3.33 (SE = 0.07, N = 33) with only 33% having insurance cover. Alcohol consumption is a practice deleterious to the handler. Mean rating for mahout was 6.2 (SE = 0.05,

N = 48) with 60% not consuming alcohol; in the case of cawadi, the mean was 3.33 (SE = 0.07, N = 33) with 33% seem to abstain.

Comparison of rating between elephants and mahout/cawadi
When the overall rating, across all parameters, was compared, the mean rating for elephants may be different from that of the mahout rating. Mean rating across all parameters for mahout may also be different from that of cawadi rating (Figure 36)
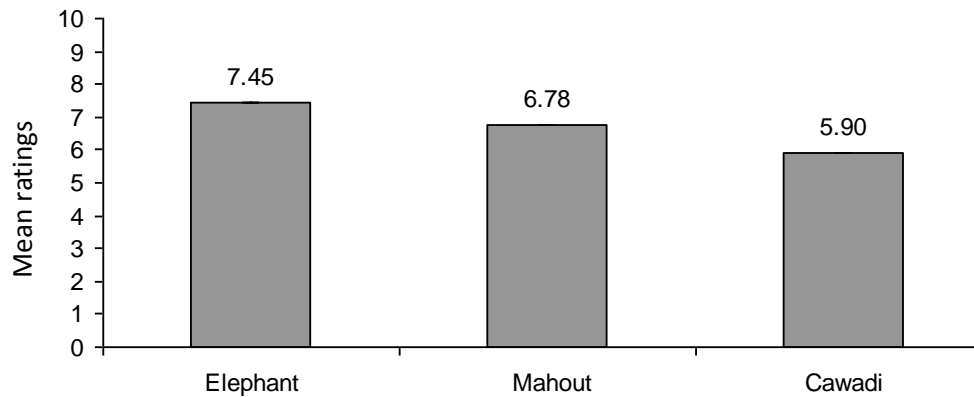

Figure 36: Overall mean ratings for elephant, mahout and cawadi

The percentage occurrence of individual values across all parameters observed for elephants shows that the values of 10 dominate (66%), followed by 0 (15%), 6 (4%) and 5 (3%). Values from 5 to 10 contribute 76% (Figure 37) suggesting the moderate to satisfactory conditions of elephant-keeping are found in the forest camps of Karnataka.
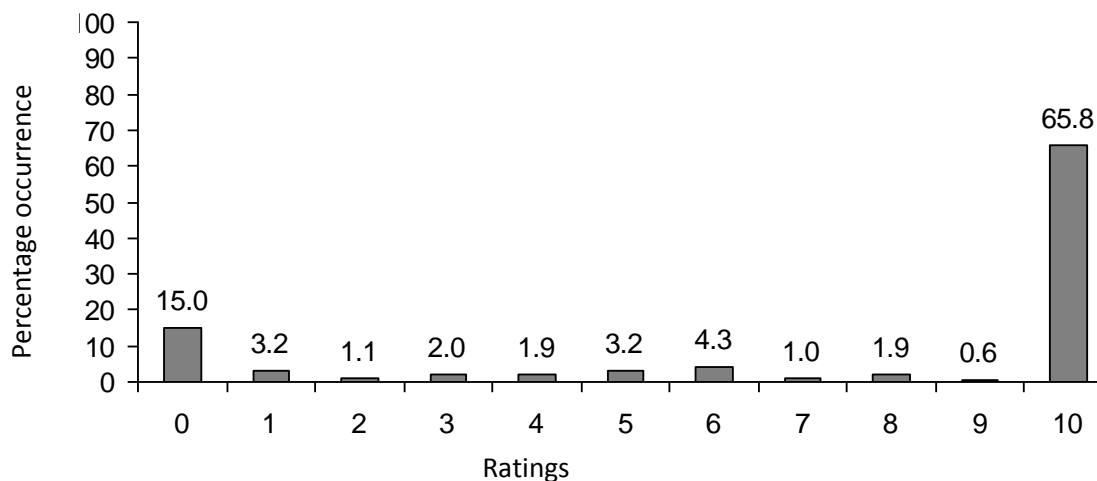

Figure 37: Percentage occurrence of individual values across all parameters observed for elephants in forest camps of Karnataka.

Discussion

Poole and Granli (in press) write about the features of wild elephants, the vast distance travelled across varied habitat, a fission-fusion society, long life span and cognitive abilities all characteristics needing attention while the species is maintained in captivity. This report uses the differences observed between wild and captive elephants in their living conditions (ecological/ social) to assess the welfare status of captive elephants: the greater the difference the lesser is the welfare of the animal.

Rating of each parameter represents the suitability of that feature in the context of the animal's welfare. Ratings between 7.5 and 10 represent near-ideal conditions and between 3 and 5 poor conditions. Ratings between 0 and 3 represent worse conditions of welfare. The mean ratings for elephants, considering all the individual scores across all the parameters observed was 7.45. This implies an overall situation with suitable living conditions. However, the following parameters were given a mean rating below 3; these parameters need to be considered by the people managing the elephants to make appropriate changes:

Camp elephants were allowed to range free but chaining offset this, drag chains, cuff chains or chains around the body. The more free ranging time an elephant is allowed, the greater will be its welfare in terms of opportunity to express species-typical activities. Tying chains around the animal to ensure it comes back at the appropriate time or tracking can be done easily will only create adverse conditions. Most of the elephants seem to be chained in more than one region: legs/leg and neck/over the body. Constant rubbing of the chain material against the skin of the animal may lead to abrasion-related injuries (Kurt and Garai, 2007).

Elephants in Musth maybe aggressive towards people, injuring or killing people in the vicinity. Such incidents need to be managed with care such that the animal and people around are not harmed. Most of the elephants in Musth seem to be chained and/or kept in isolation. This adds to the behavioral trauma experienced by the animal. Chained elephants expressed greater frequency of stereotypy (Gruber et al., 2000).Very few animals in this condition were allowed to roam free in the forest. Almost 80% of the elephants seem to suffer from disease/injury, foot injury and stomach-related problems occurring more frequently. This aspect needs to be looked into by the elephant keepers. Tests of dung/urine/blood were done for only a few of the camp elephants. Body measurements were also not taken. Both these parameters are important indicators of the animal's health.

The following parameters were given a rating below 5 and they need to be considered for improvement.

Free-ranging status

Elephants were chained, either to one place, or allowed to range free, but with chains. Both situations are not conducive to the well-being of the animal. Chaining and free-ranging opportunity needs to be balanced such that restriction on movement is minimal for the animal.

Frequency of occurrence of disease/injury

The ratings show that frequency of occurrence falls between regular and occasional. This implies prevalence of conditions leading to repeated occurrence of disease/injury. The reasons for the same needs to be studied and problems rectified.

Health status

The ratings of health status of the animal, on average, seems to suggest non-curable ailments, not leading to further medical problems. This is borne by the fact that five elephants are blind in one eye. Some of the animals also have injuries which have been treated and are now recovering. The reason for non-curable nature of the disease or disorder needs to be studied and improvements made.

Vaccination schedule

Vaccinations were done for only 41% of the animals observed. This needs to be rectified.

Some parameters that were given a rating between 5 and 7.5 were:
a. Distance to water source
b. Bathing duration
c. Bathing materials
d. Sleep duration
e. Work type
f. Usage of ration chart
g. Fewer calves born with the prescribed age of the animal
h. Exposure of males to female animals
i. Years of experience of the veterinary doctor in treating elephants
j. Maintenance of records

These variables have been given a rating that is not completely suitable for the animal. They can also be improved.

Ratings for mahout/cawadi and suggestions for improvement of their condition

Mean rating below 3 for mahout/cawadi were:
1. Education level
2. Cawadi's experience with his elephant
3. Insurance cover for cawadi
4. Alcohol consumption by cawadi

The above parameters are important as they have been given a rating less than 3 indicating poor conditions of that particular variable. Each is important as it affects the welfare of the Mahout/Cawadi and thus that of his animal.

Mean rating between 3 and 5 were:
1. Cawadi's wages
2. Rate of alcohol consumption by Mahout/cawadi

The above parameters show below average level of wage for the Cawadi and higher frequency of alcohol consumption by both Mahout/cawadi. Both these issues need to be addressed to improve their condition.

Mean rating between 5 and 7:
1. The experience of Mahout/Cawadi in relation to his own age
2. Reasons for choosing the profession of handling elephants
3. Training of mahout
4. Insurance cover for mahout
5. Alcohol consumption by mahout

These ratings imply less than ideal conditions. For instance, it shows that alcohol consumption by mahouts is relatively high and may affect his handling of elephants. All the parameters listed above require improvement of their status.

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Section 5:
Captive Elephants in Forest camps of Kerala

Section 5a:
Captive Elephants in Muthanga Forest Camp

Executive summary

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Introduction

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

Objective

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

Method

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

Rating method

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

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

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

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

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

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

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

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

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

- All three elephants were maintained for their use as *Koonkie* (*Kumki*) in forest conditions
- Occasionally used in tourism related work

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

Shelter

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

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

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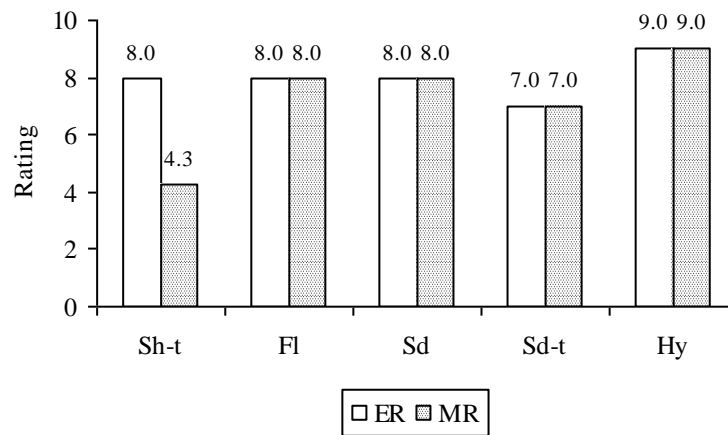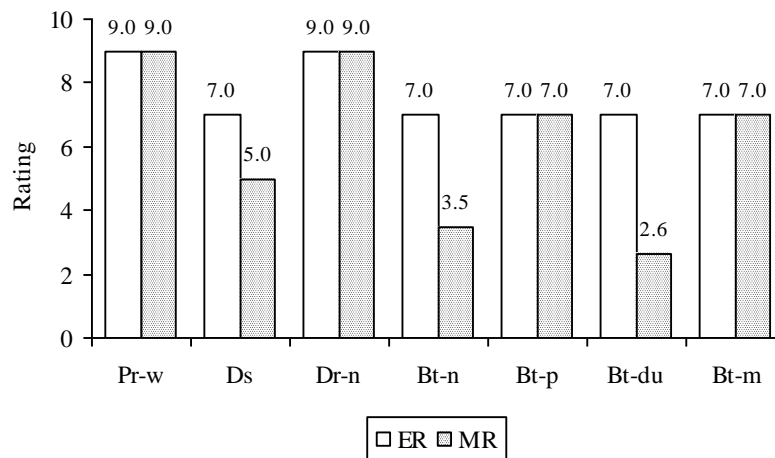

Figure 1: Comparison of E-R and M-R for 'shelter' sub-parameters
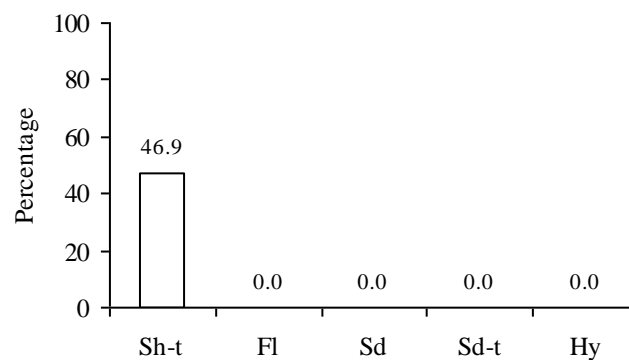
Sh: Shelter type Fl: Floor   Sd: Shade availability   Sd-t: Shade type
Hy: Maintenance of hygiene

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

Water and related parameters

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

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

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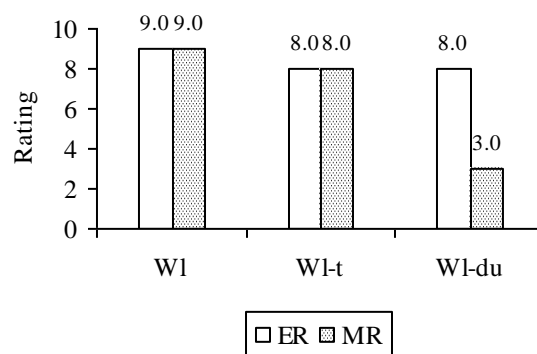

Figure 3: Comparison of E-R and M-R for 'water' sub-parameters
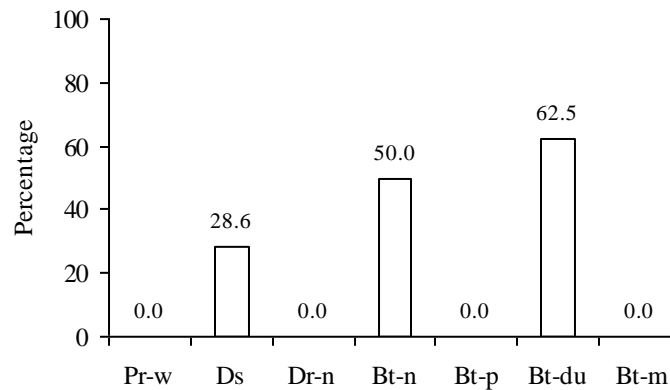
Pr-w: Availability of perennial source of running water   Ds: Distance to water source
Dr-n: Number of times drinking water   Bt-n: Bathing number of times   Bt-p: Bathing place
Bt-du: Bath duration   B t-m: Bathing materials

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

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

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

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

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

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

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

Figure 5: Comparison of E-R and M-R for 'walk' sub-parameters
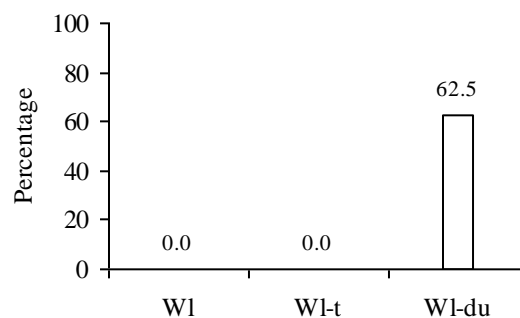
Wl: Opportunity to walk   Wl-t: Time of walk   Wl-du: Walk duration

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

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

- The elephants in the FC were allowed to interact while free-ranging from 8a.m. to 6p.m.

- Number of individuals was three and all were adult males.

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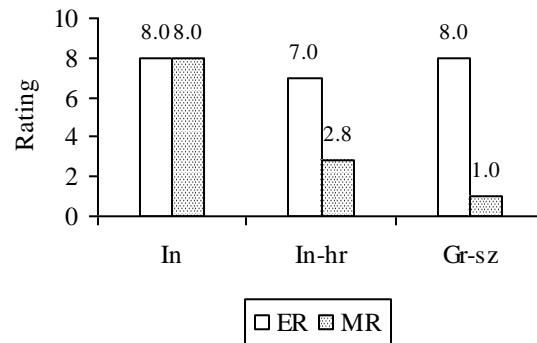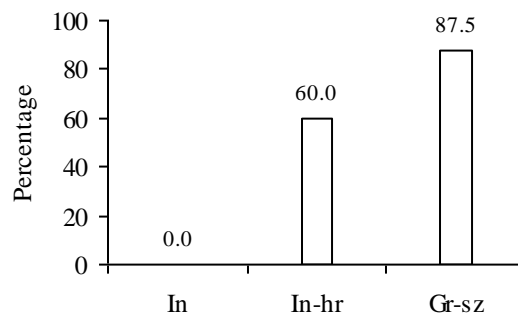

Figure 7: Comparison of E-R and M-R for 'Interaction' sub-parameters

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

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

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

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

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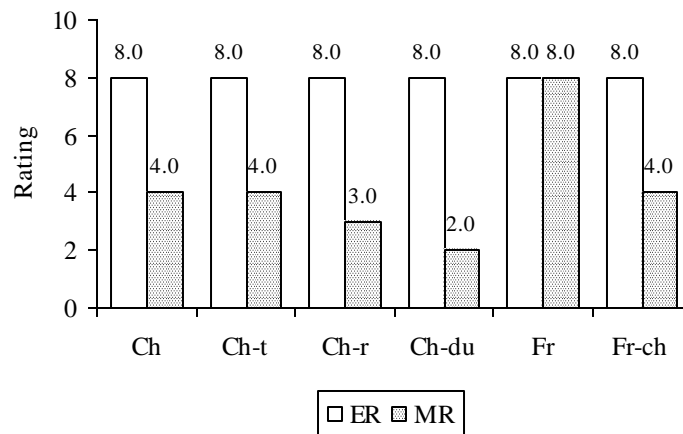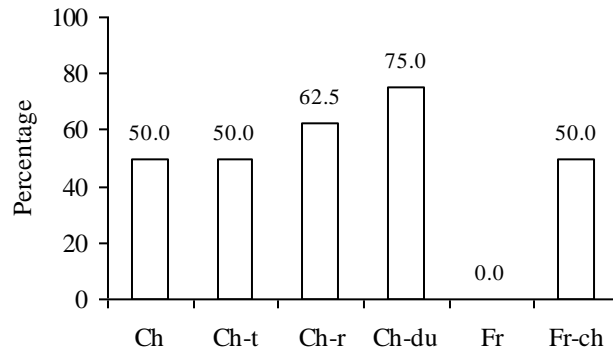
Figure 9: Comparison of E-R and M-R for 'chaining' sub-parameters

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

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

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

- All three elephants were described as timid to aggressive, occasionally undependable, partially aggressive to other elephants or people
- There were no incidents of injury to people, except for a male in musth, which had injured its mahout
- None of the elephants exhibited stereotypy

M-R was 7.0 (SE= 1.9, N*= 3) with a deviation of 12.5% from E-R. Figure 11 and 12 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.
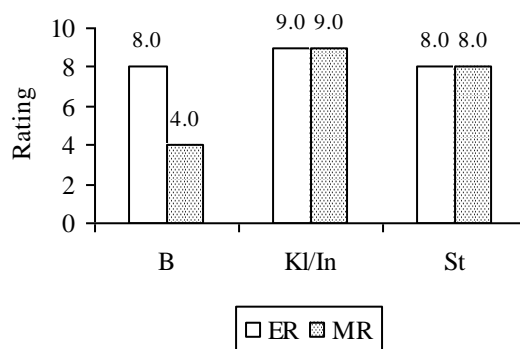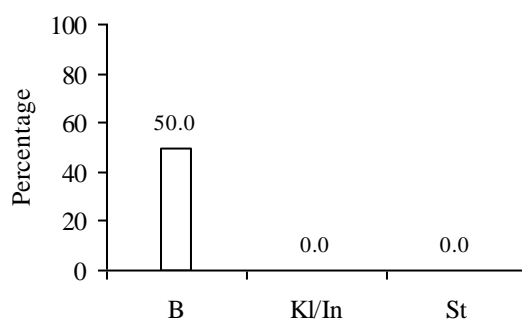
135

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

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

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

Work

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

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

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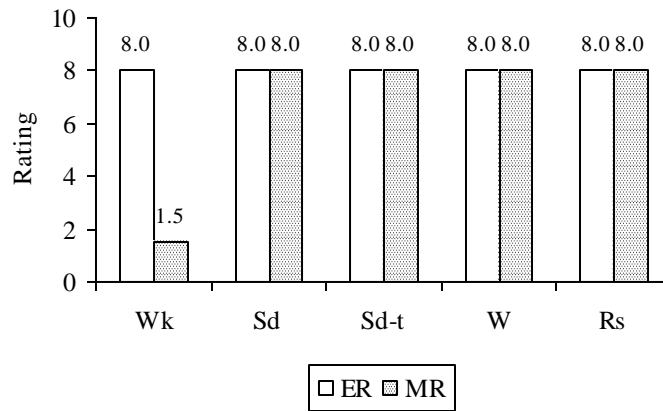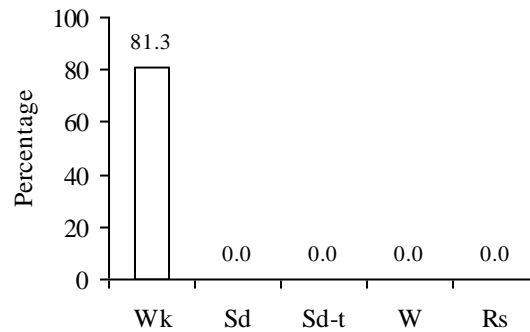
Figure 13: Comparison of E-R and M-R for 'work' sub-parameters

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

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

Food

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

- All the elephants were given stall feed and allowed to graze/ browse in forest
- Stall feeding duration was from 9a.m. to 9:30a.m. and all night
- Food provided was: grass, concentrate food consisting of a mixture of horse gram (*Macrotyloma uniflorum*), wheat (*Triticum aestivum*), rice (*Oryza* sp.), ragi (*Eleusine coracana*), salt and mineral mixture
- Ration chart was maintained

M-R was 6.4 (SE= 1.4, N*= 5) with a deviation of 20% from E-R. Figures 15 and 16 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.
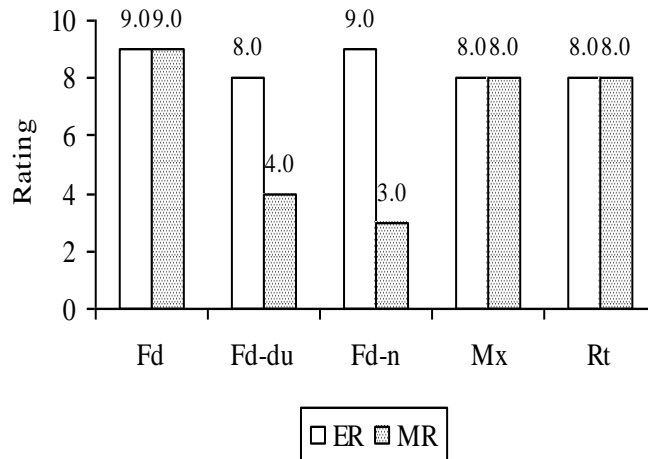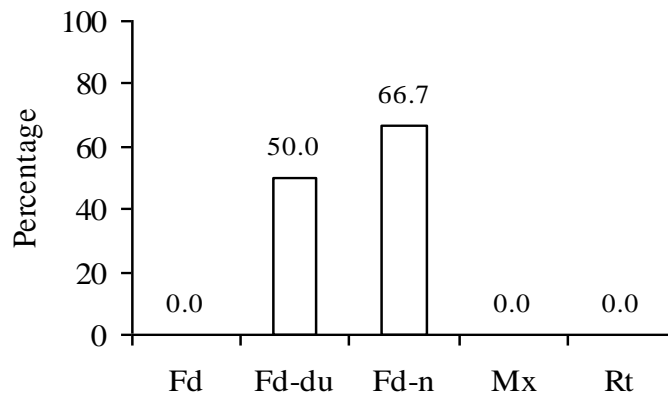
137

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

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

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

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

- All the elephants exhibited musth
- Whether allowed exposure to females for mating/ sired offspring was not known
- During musth, the elephants were chained with a long chain, not isolated
- A 15y old male was reported to have injured a mahout during musth

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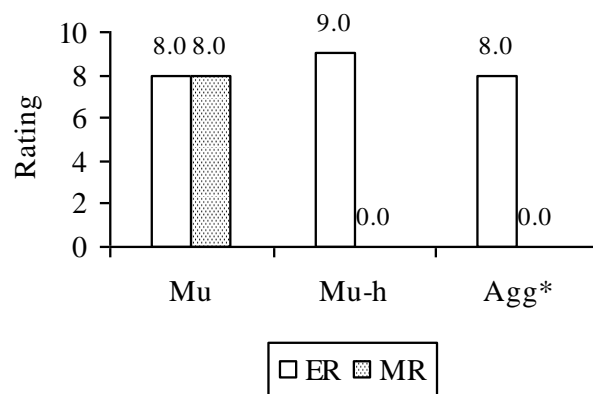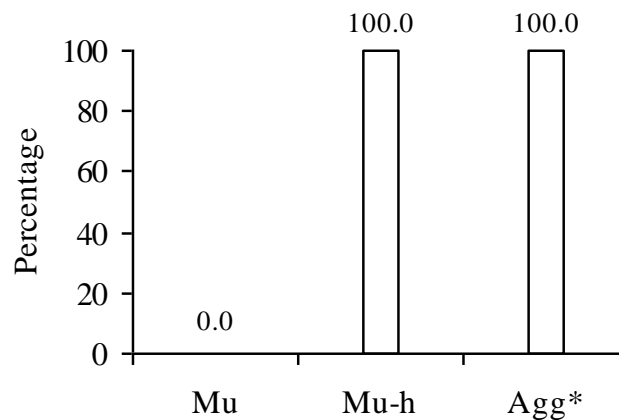
Figure 17: Comparison of E-R and M-R for 'male rep status' sub-parameters

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

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

Health status and veterinary protocol

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

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

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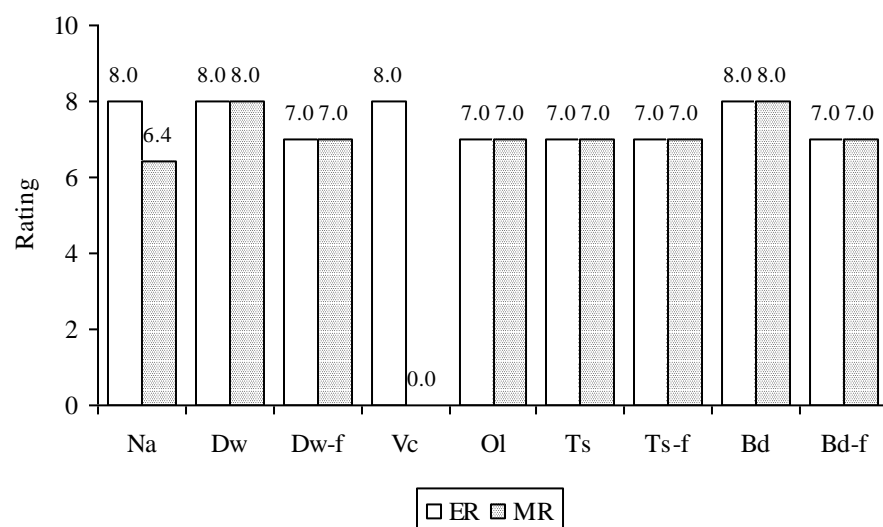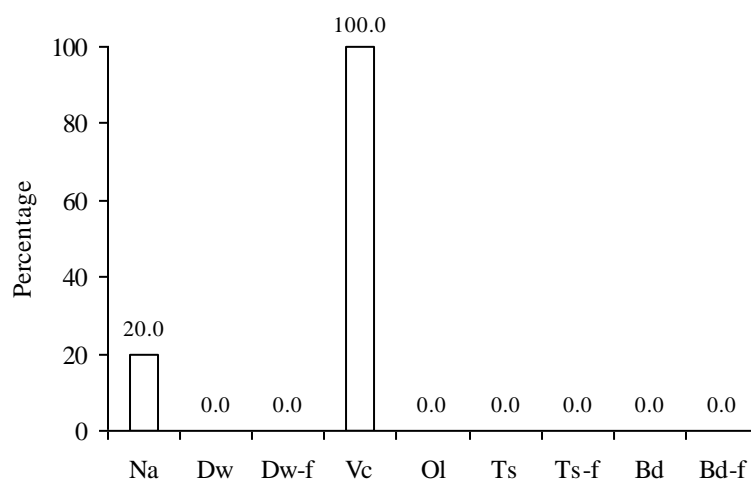
Figure 19: Comparison of E-R and M-R for 'health status' sub-parameters

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

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

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

- The elephants had access to a veterinary doctor with 5y experience in treating elephants

- Veterinary assistant was not available
- Health and service records were maintained
- Cooking shed, food preparation hall, provision shed, kraals, animal stand and camp site were available; accommodation for staff was not available

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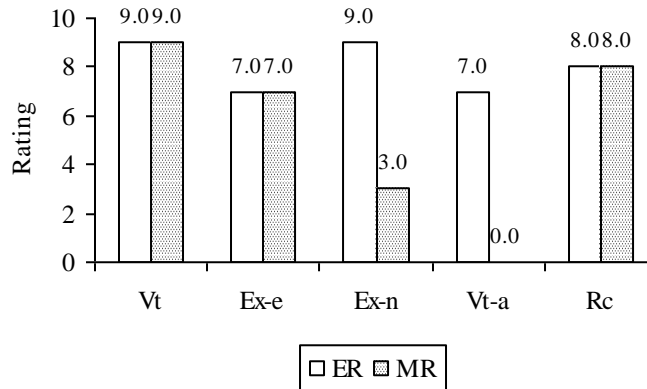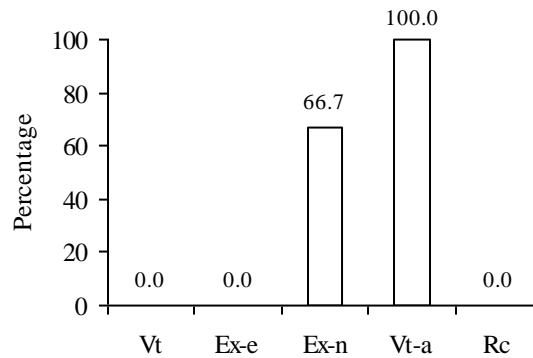

Figure 21: Comparison of E-R and M-R for 'veterinary personnel' sub-parameters

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

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

Handler's socio-economic status
Handlers from a traditional background of dealing with elephants may have more knowledge about elephant life, or having relatives in this profession may help in discussing professional conflict issues. Insufficient remuneration may indirectly affect elephant care.
- The handlers' age was in the range of 15-20y
- All were tribals, with a family occupation of *coolie* (labourer)

- Education was upto the primary school level
- Annual salary was Rs.54,000/-
- The handlers spent 11-12h with their elephants, used ankush (*Thotti*) and stick to control their elephant
- All were covered by insurance, paid by the forest department
- All consumed alcohol, occasionally

M-R was 4.3 (SE= 1.4, N*= 7) with a deviation of 39.2% from E-R. Figures 23 and 24 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.
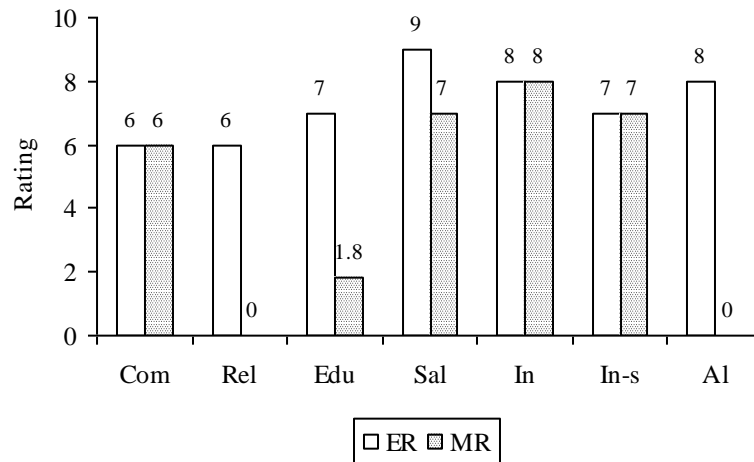
Figure 23: Comparison of E-R and M-R for handlers' 'socio-economic status' sub-parameters
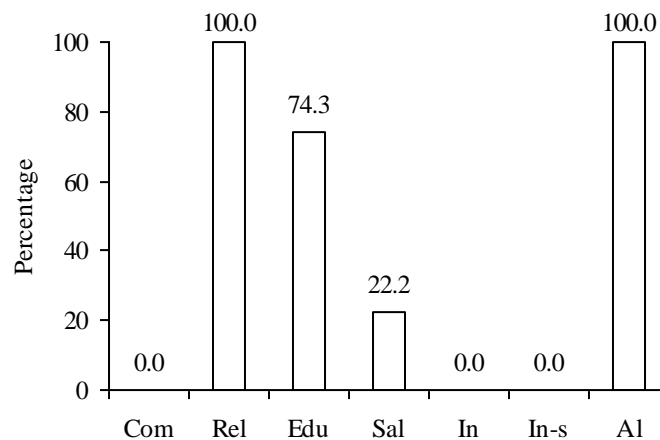
Com: Community   Rel: Relatives in this profession Edu: Education level
Sal: Salary drawn In: availability of insurance In-s: Source of insurance Al: Consumption of alcohol

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

Overall Welfare Status

Overall M-R for elephant welfare status was 5.7 (SE= 0.4, N*= 58) showing a deviation of 29.3% from E-R. Figure 25 gives the occurrence of different classes of deviation across all the

observed parameters. Maximum occurrence (55%) of minimum deviation (0%) was seen, implying occurrence of near natural conditions.

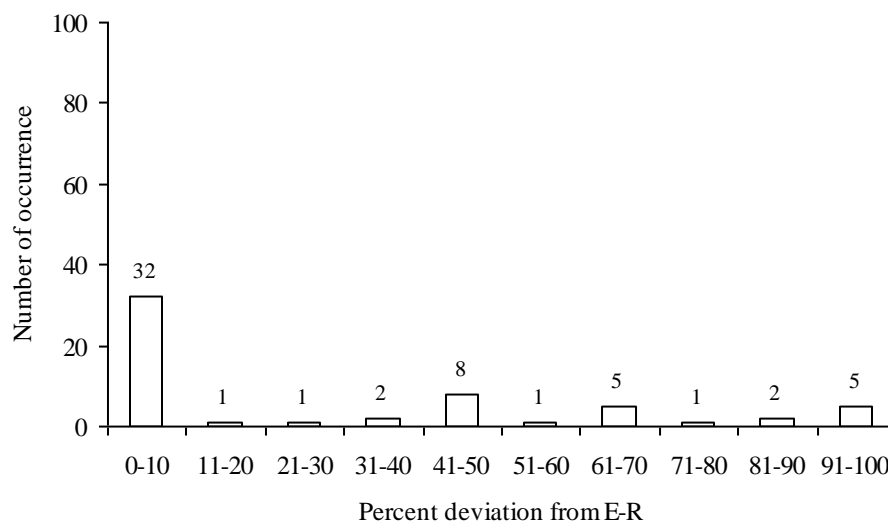Among the parameters showing minimum deviation however, a large number related to veterinary care (31%), implying a fairly optimum level of veterinary fecilities and care. The parameters which showed a deviation of 50% or more from E-R were distributed across all the observed features implying absence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

N*= 58

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

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

Parameters which showed deviations of 50% or more:
- The elephants were allowed to free range in forest conditions; however, they were all chained at night. Hence, standards of shelter type were less than the prescribed norms.
- The elephants were bathed only once, with no access to water while being tethered. Only when free ranging or when taken for a bath by their mahouts, they could access water sources.
- The practice of tethering the elephants with a one meter chain at night restricted movement and ability to select a suitable sleeping place/position.
- Walk duration was restricted to the time when allowed to free range, with the mahouts/ cawadis bringing the elephants back from the forest by 5p.m.
- Foraging duration was restricted to the time allotted to free ranging in the forest (9-9:30a.m. to 5p.m.); the elephants were stationary and stall fed for the remaining duration of the day.
- Provision for expression of reproductive behaviour was absent in the absence of female elephants in the camp

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

Handlers' status

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

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EXECUTIVE SUMMARY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Introduction

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

Objective

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

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

Method

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

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

Rating method

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

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

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

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

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

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

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

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

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

- The elephant was maintained for timber hauling

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

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

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

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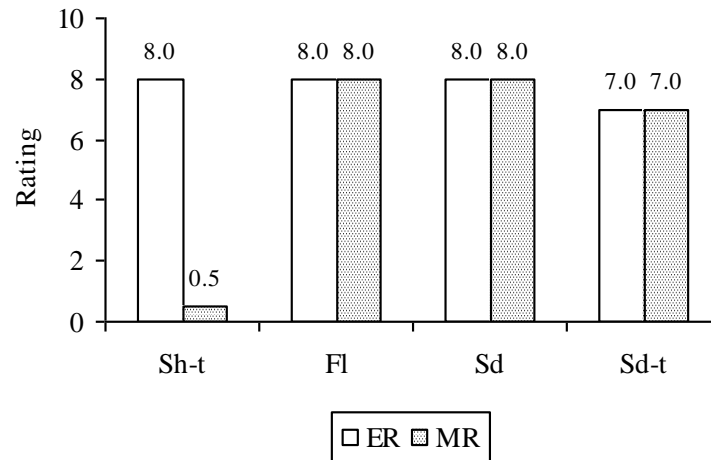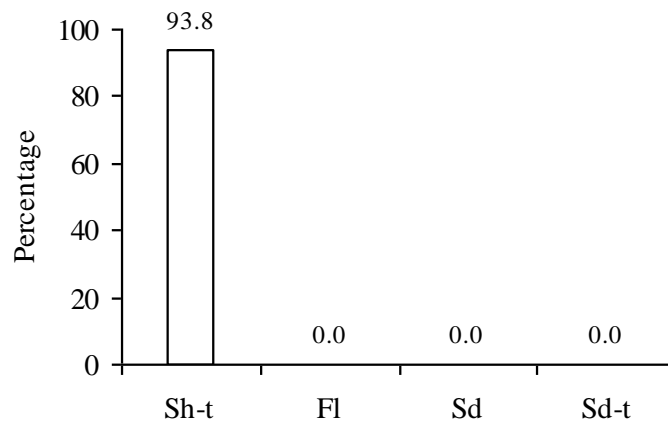

Figure 1: Comparison of E-R and M-R for 'shelter' sub-parameters

Sh: Shelter type Fl: Floor   Sd: Shade availability   Sd-t: Shade type

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

Water and related parameters

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

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

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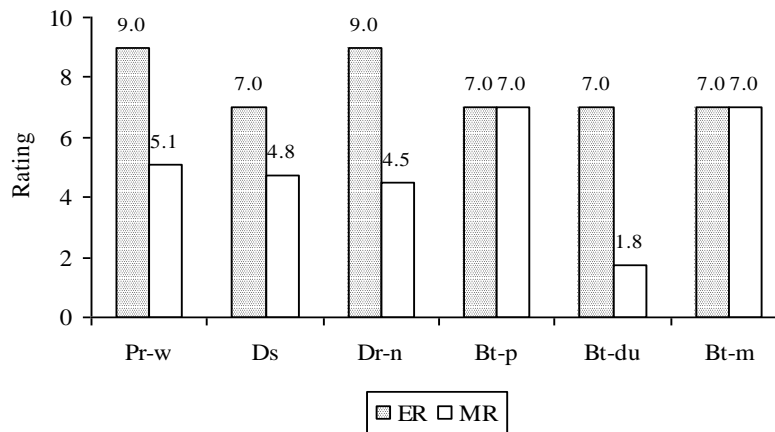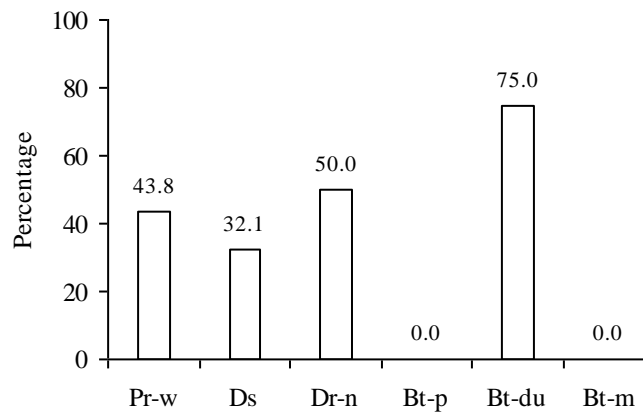

Figure 3: Comparison of E-R and M-R for 'water' sub-parameters

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

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

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

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

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

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

- The elephant was walked when bathed/ while feeding or when working
- Duration of walk was one hour

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

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

- The elephant was maintained singly with no opportunity for interaction

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

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

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

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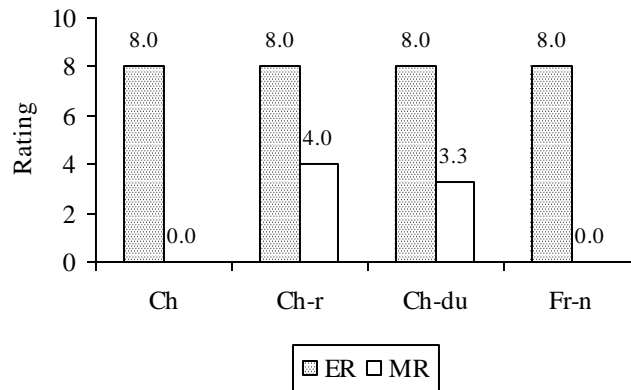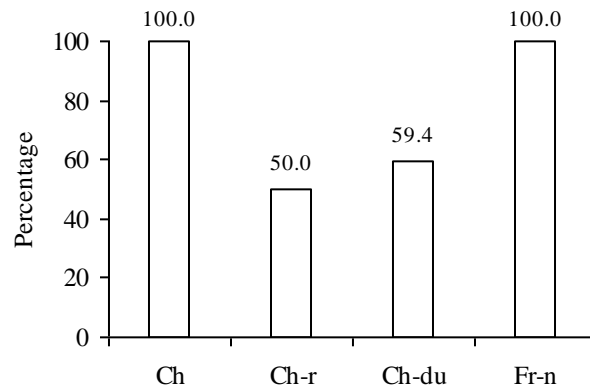
Figure 5: Comparison of E-R and M-R for 'chaining' sub-parameters

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

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

Observed behaviour

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

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

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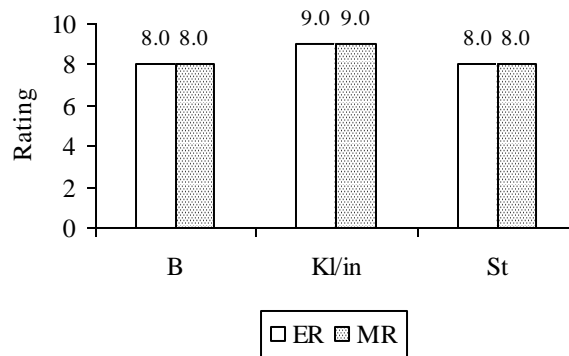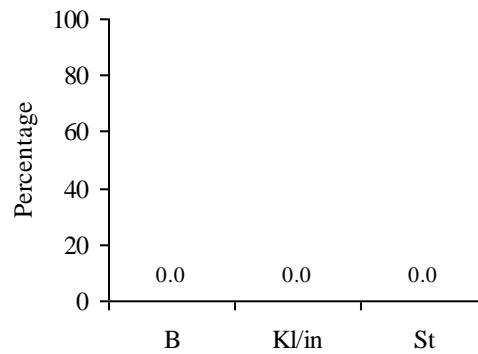
Figure 7: Comparison of E-R and M-R for 'behaviour' sub-parameters

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

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

Work

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

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

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

Food

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

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

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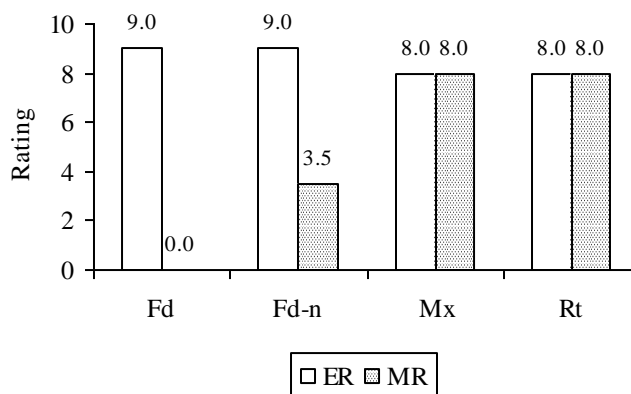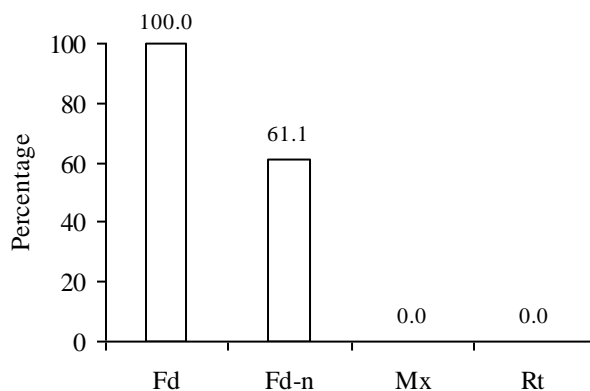

Figure 9: Comparison of E-R and M-R for 'food' sub-parameters

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

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

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

- The male had not been reproductively active
- It was not exposed to females/ been bred

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- Musth was reported for the elephant; was not aggressive during this period and normal chaining was practiced even during musth

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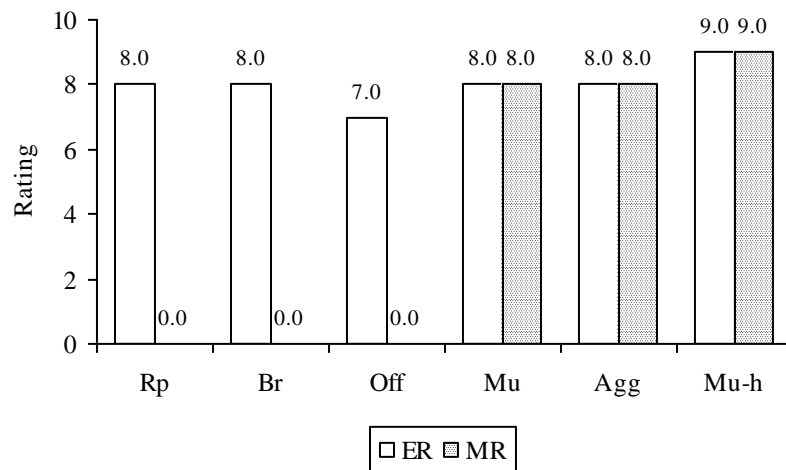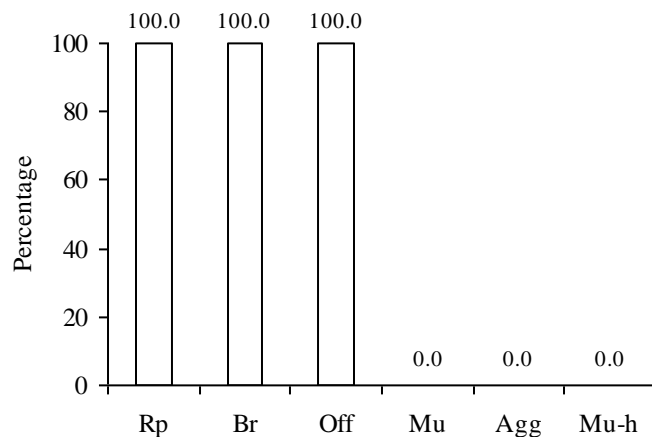

Figure 11: Comparison of E-R and M-R for 'male reproductive status'

Rp: Reproductively active/ not   Br: Opportunity to breed   Off: Offspring sired
Mu: Occurrence of musth   Agg: Aggression during musth   Mu-h: Handling of musth

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

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

- Occurrence of intestinal worms, constipation, indigestion, minor wounds was observed

- Deworming was done
- Oil was applied on the body
- The elephant was not immunized
- Dung samples were examined once in three months and blood/ urine samples annually

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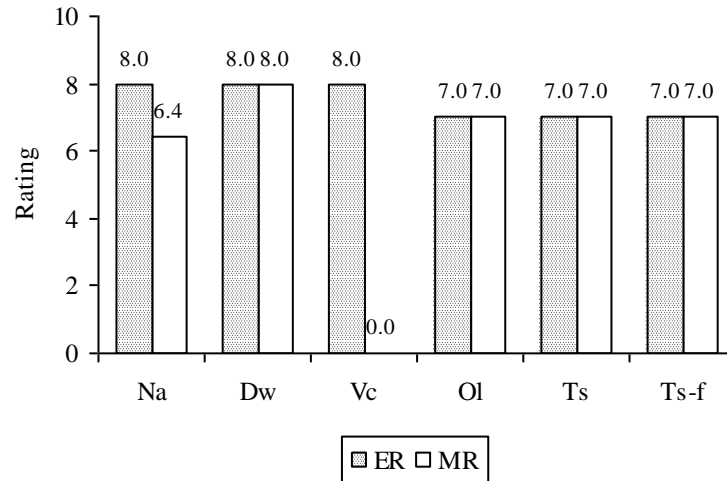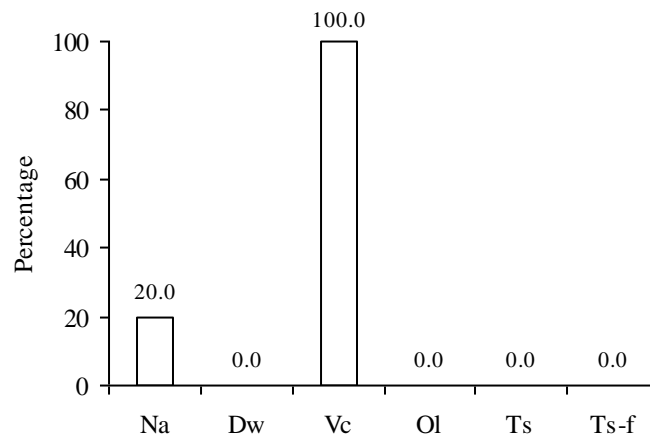

Figure 13: Comparison of E-R and M-R for 'health status' sub-parameters

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

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

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

- The elephant had access to a veterinary doctor with 14y experience in treating elephants
- The doctor visited the center occasionally

- Accommodation for staff, cooking shed, food preparation hall, provision shed and camp site were available; veterinary care unit was not available

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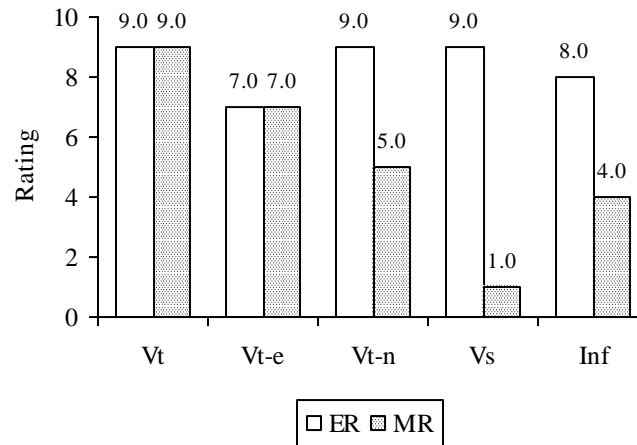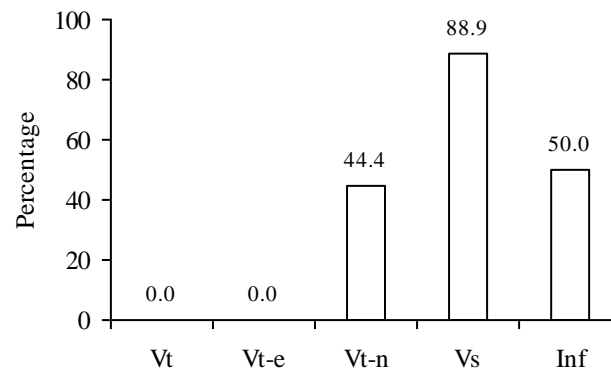

Figure 15: Comparison of E-R and M-R for 'veterinary personnel' sub-parameters

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

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

Handler's socio-economic status
- The elephant had two handlers; both were temporarily employed with experience in this profession being 5 and 15y.
- Annual salary drawn was Rs.54,000/-
- Both handlers consumed alcohol

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

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Overall Welfare Status

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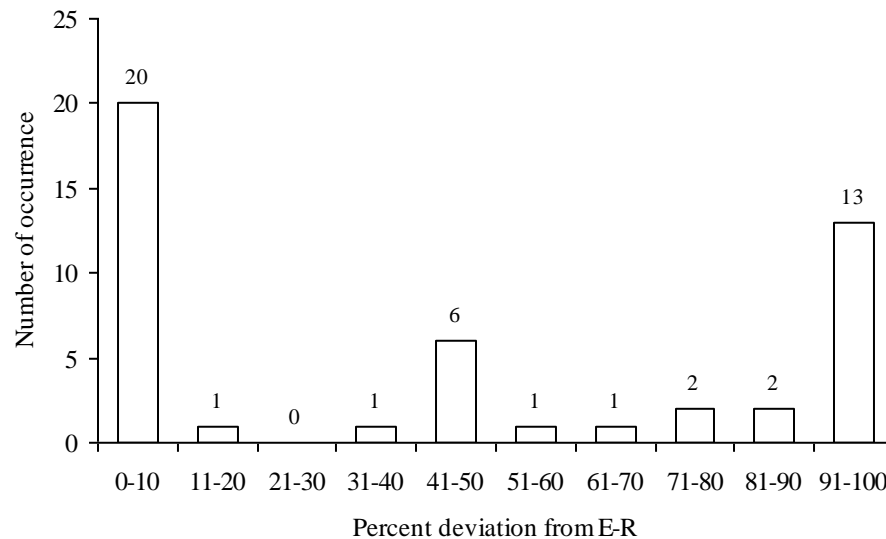
N*= 47

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

Discussion

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

Features which were not suitable for the elephant:
- The physical features such as natural vegetation, vast space, earthen flooring and availability of running water were all positive aspects of this place. This was, however, offset by the practice of chaining the elephant to a tree for 12-20h, making most of these features inaccessible to the elephant.
- Since it was caught in the wild, the change undergone by it when subjected to captivity would be immense. This change was not reduced; the opposite was achieved by maintaining it in isolation without access to females and no opportunity to free range to forage in the adjacent forests. In addition, walking was restricted either due to work schedule or due to being chained. When not working or being bathed, the elephant had no psychological stimulation other than feeding.

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

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

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Section 5c:
Captive Elephants in Kottur Elephant Care Center

EXECUTIVE SUMMARY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shelter

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

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

M-R was 6.8 (SE= 1.0, N*= 4) implying a deviation of 14.8% from E-R. Figures 1 and 2 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.
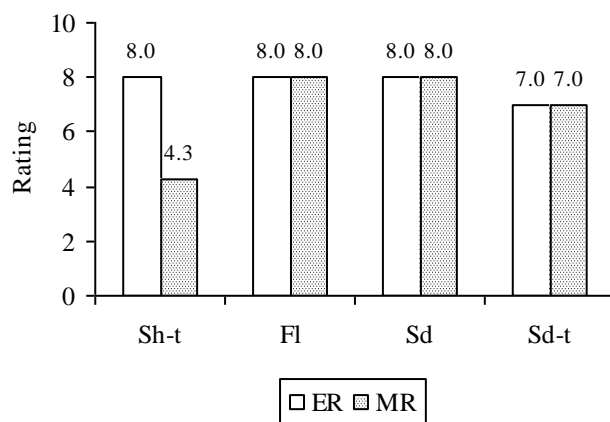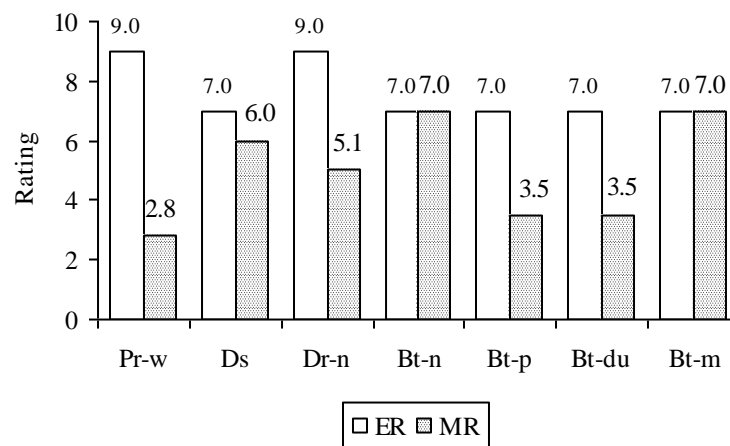
Figure 1: Comparison of E-R and M-R for 'shelter' sub-parameters
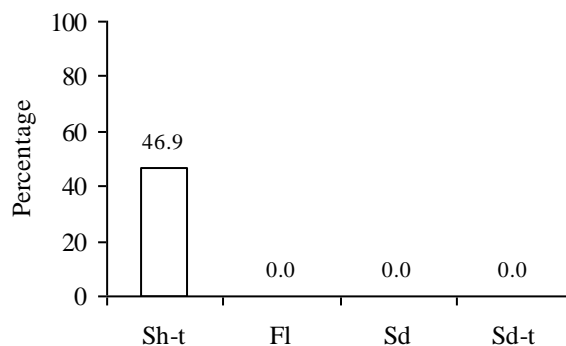
Sh: Shelter type Fl: Floor Sd: Shade availability Sd-t: Shade type

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

Water and related parameters

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

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

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

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

Figure 4: Percentage wise deviation from E-R for 'water' sub-parameters
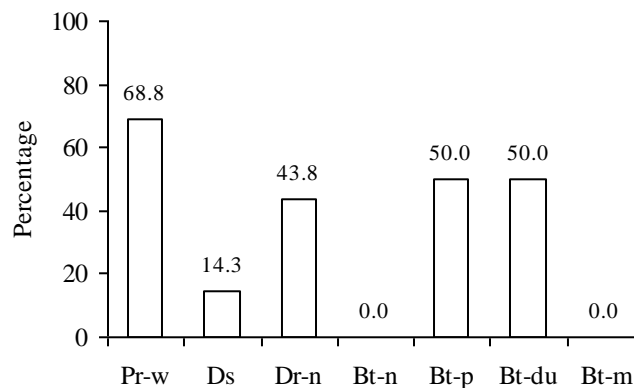
Pr-w: Availability of perennial source of running water   Ds: Distance to water source
Dr-n: Number of times drinking water   Bt-n: Nuber of times bathed   Bt-p: Bathing place
Bt-du: Bath duration   Bt-m: Bathing materials

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

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

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

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

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

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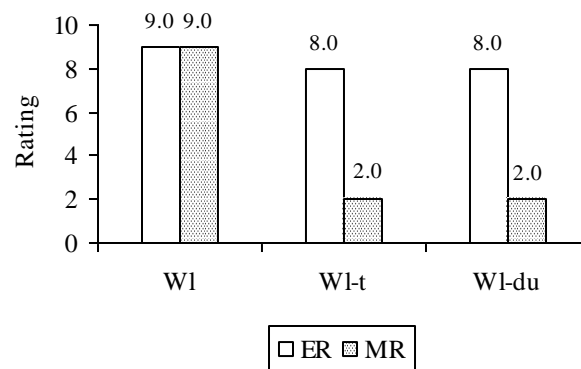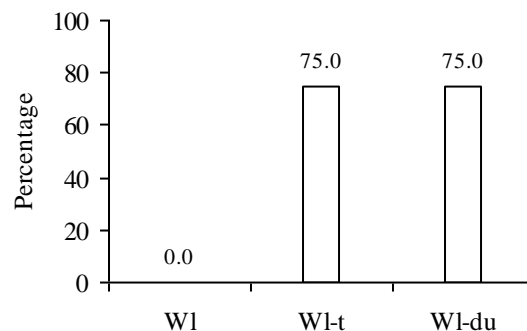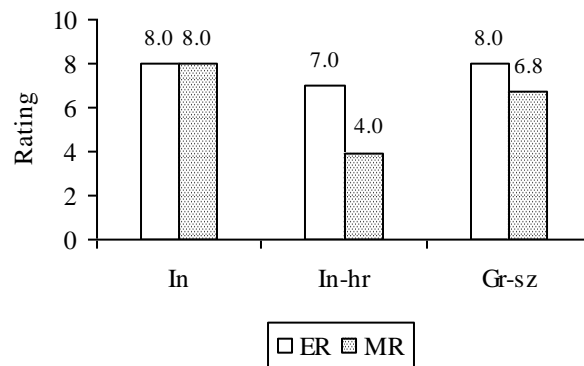
Figure 5: Comparison of E-R and M-R for 'walk' sub-parameters

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

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

Social interaction

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

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

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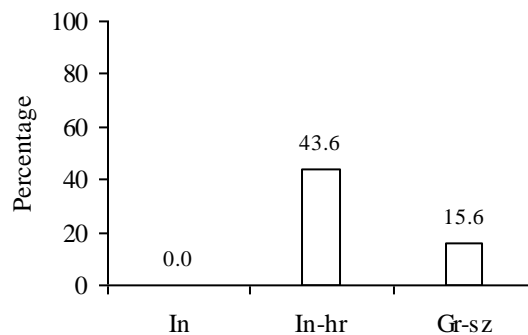

Figure 7: Comparison of E-R and M-R for 'interaction' sub-parameters

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

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

Chaining

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

- All elephants were chained with a 1m chain tied to one leg
- The elephants were chained from 6p.m. to 8a.m.
- Free-ranging opportunity was provided for 1-2h duration within the enclosure; Weather permitting free ranging was allowed in the nearby forest for 2h

- No opportunity to free range at night

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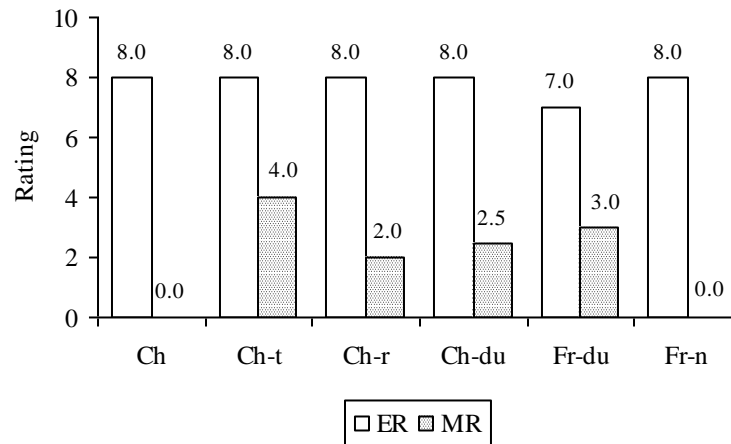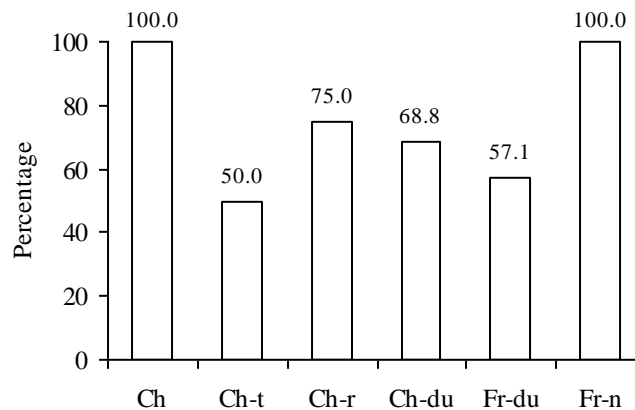

Figure 9: Comparison of E-R and M-R for 'chaining' sub-parameters

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

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

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

- All elephants were described as docile

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

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

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

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

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

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

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

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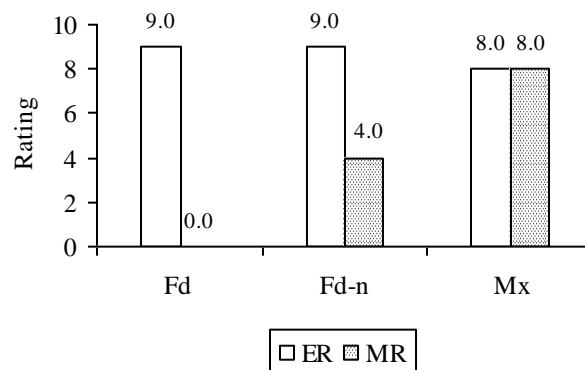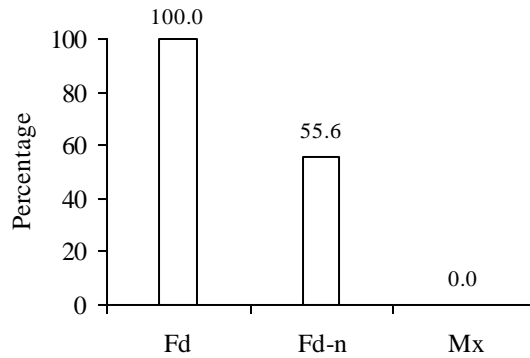

Figure 11: Comparison of E-R and M-R for 'food' sub-parameters

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

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

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

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

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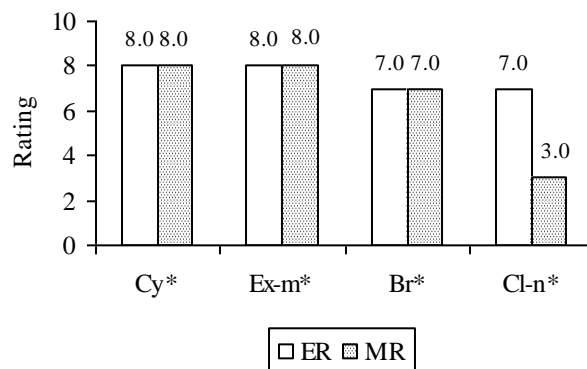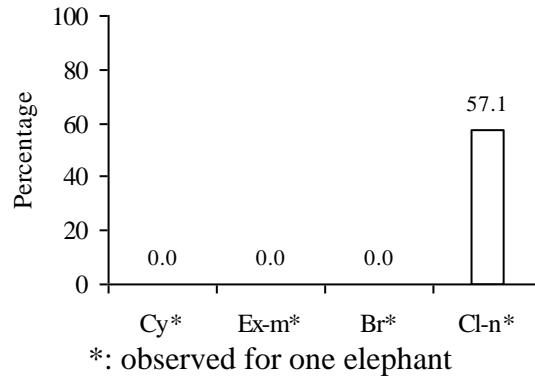

Figure 13: Comparison of E-R and M-R for 'female reproductive status'

*: observed for one elephant

Cy: Occurrence of oestrus cycles   Ex-m: Exposure to males   Br: Opportunity to breed   Cl: Calf birth

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

Health status and veterinary protocol

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

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

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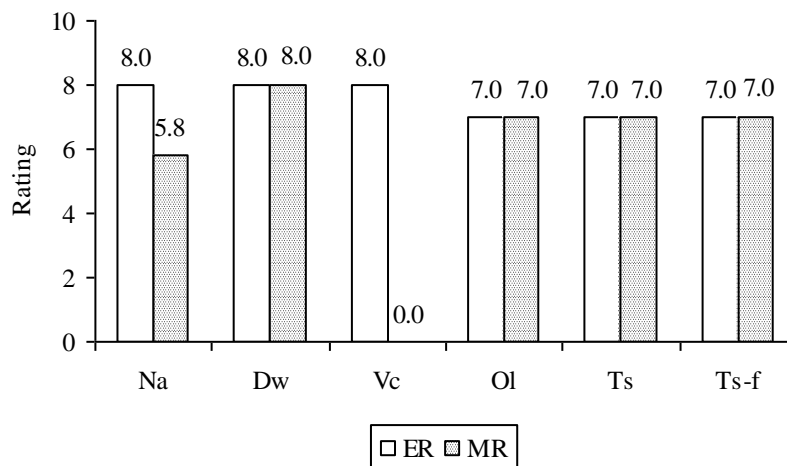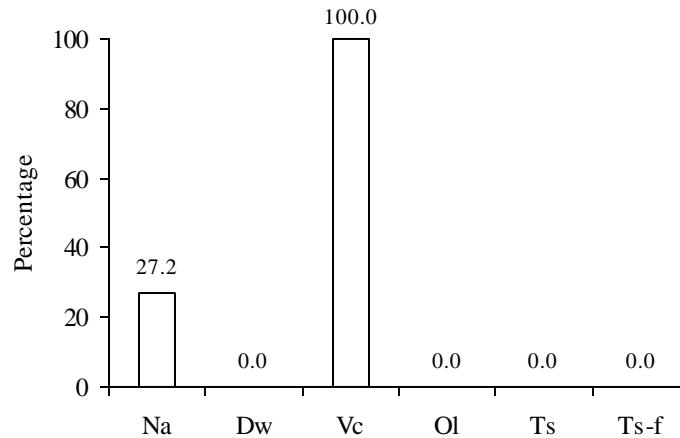

Figure 15: Comparison of E-R and M-R for 'health status' sub-parameters

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

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

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

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

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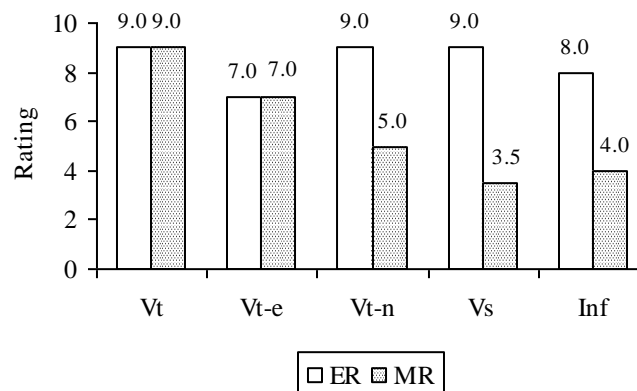

Figure 17: Comparison of E-R and M-R for 'veterinary personnel' sub-parameters
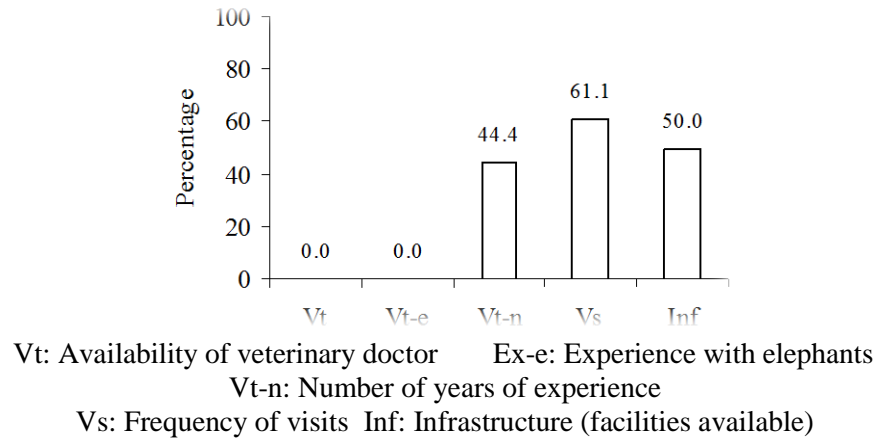
175

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

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

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

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

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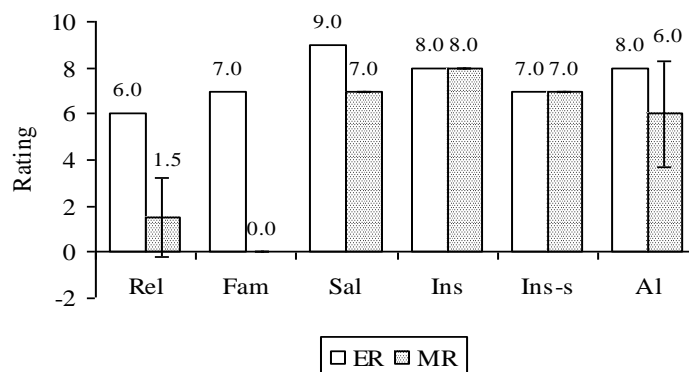

Figure 20: Comparison of E-R and M-R for 'handlers' socio-economic status' sub-parameters
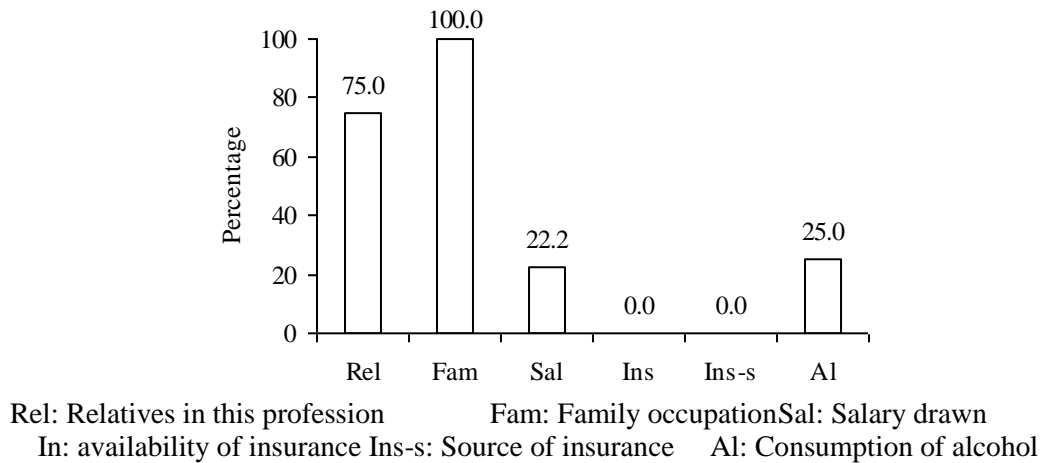
Rel: Relatives in this profession   Fam: Family occupation Sal: Salary drawn
In: availability of insurance Ins-s: Source of insurance   Al: Consumption of alcohol

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

Overall Welfare Status

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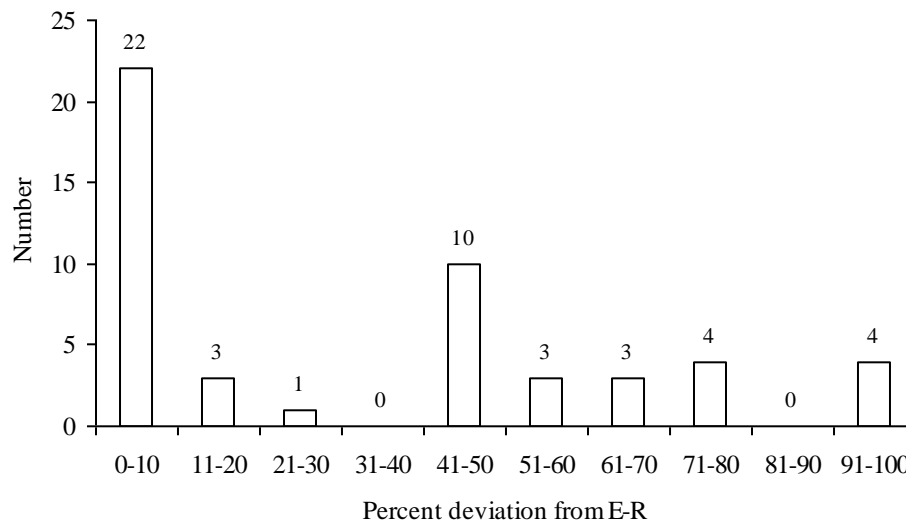
N*= 50

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

Discussion

The complex social life of elephants, their dependence on learning in a social context, their ability to traverse vast distances, generalist feeding habits, their immense size, all add to the complex requirement of the species in captivity. Added to this fact, is their non-domestic nature, of not being genetically altered through selective breeding and introduction of new individuals

from the wild. Thus, deviations from the wild, observed in a captive context, have been used as an indicator of welfare status for the animals.

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

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

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

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4. Varma, S. and Prasad, D. (2008) Welfare and management of elephants in captivity— insights and recommendations, In: Welfare and management of elephants in Captivity: Proceedings of a Workshop on Welfare Parameters and their Significance for Captive Elephants and their Mahouts in India. (S. Varma and D. Prasad, eds.), pp. 54-64. Ministry of Environment and Forests (MoEF), Government of India, Compassion Unlimited Plus Action (CUPA) and Asian Nature Conservation Foundation (ANCF), Bangalore, India.
5. Varma, S., Sujatha S.R., van de Brand, J., Ganguly, S. and Shiela R., (2008) Draft concept note on welfare parameters and their significance for captive elephants and their mahouts in India, In: Welfare and management of elephants in Captivity: Proceedings of a Workshop on Welfare Parameters and their Significance for Captive Elephants and their Mahouts in India. (S. Varma and D. Prasad, eds.), pp. 17-53. Ministry of

Environment and Forests (MoEF), Government of India, Compassion Unlimited Plus Action (CUPA) and Asian Nature Conservation Foundation (ANCF), Bangalore, India.

Section 5d:
Captive Elephants in Konni Forest Camp

Executive summary

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

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

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

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

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

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

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

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

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

One adult female elephant was used for timber hauling, in festivals and for tourism; work duration was 2 hrs/ day. Howdah (made of iron with cushion) was used, weighing 100kgs, for

carrying tourists. The 66 yrs male had been retired from work. M-R was 5 showing a deviation of 32.3% from E-R.

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

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

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

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

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

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

Introduction

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

Objective

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

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

Method

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

Rating method

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

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

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

- Therefore, using the maxima given by experts as a base, a rating scale starting from zero to the particular maximum value for that parameter has been used and the data for each animal was collected, in a given regime (for example, forest camp or temple).

- In this investigation, variables which represent a common feature of the captive situation have been grouped to form a parameter. The variables have been termed sub-parameters. For example, the variables shelter type, shelter size, floor type in the shelter; all represent different aspects of the physical space provided to the elephant. Hence, they are grouped together to form the parameter "Shelter" and each constituent variable is a sub-parameter. In this investigation, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters. The Mean Rating (M-R) for a parameter is the mean of M-Rs across related sub-parameters and denotes welfare status of existing conditions on the ground for the particular parameter.

- The number of such related parameters (sub-parameters) varies for each regime.

- Results have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the parameters observed. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.

- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) have been used to indicate the professional/ socio-economic status of value to the handler and his elephant.

- N* refers to number of sub-parameters observed. N refers to number of individuals.

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

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

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

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

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

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

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

Shelter

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

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

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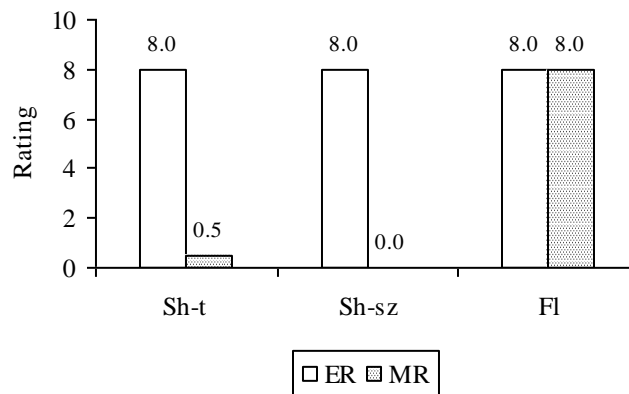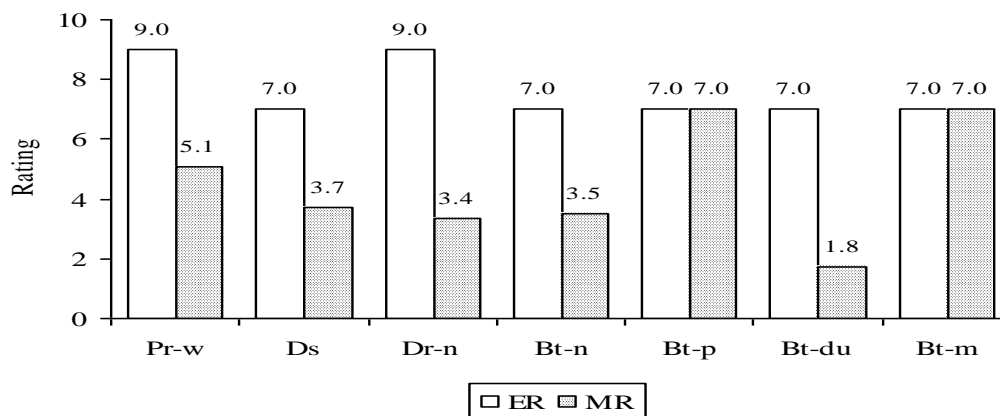

Figure 1: Comparison of E-R and M-R for 'shelter' sub-parameters
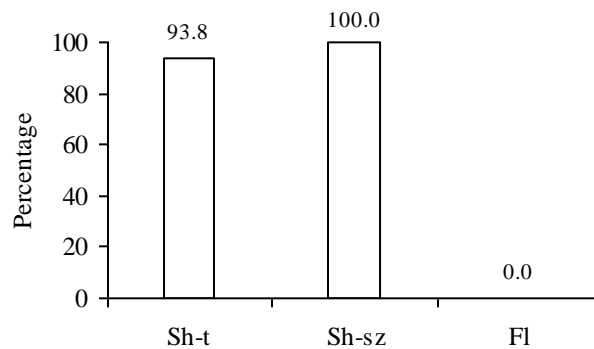
Sh: Shelter type   Sh-sz: Shelter size   Fl: Floor

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

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Water and related parameters

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

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

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

Figure 3: Comparison of E-R and M-R for 'water' sub-parameters
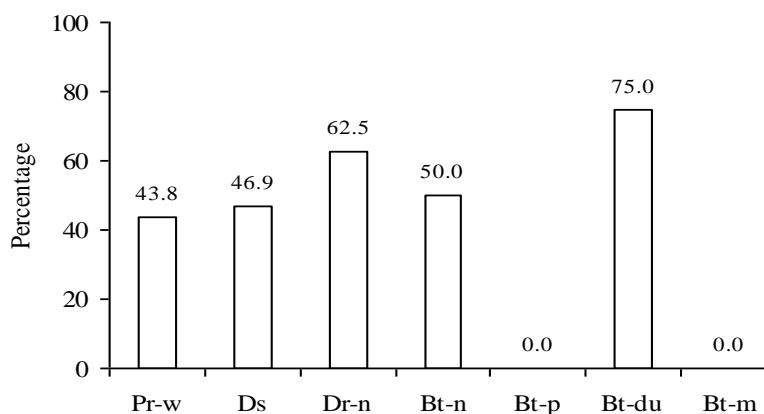
Pr-w: Availability of perennial source of running water   Ds: Distance to water source
Dr-n: Number of times drinking water   Bt-n: Number of times bathed   Bt-p: Bathing place
Bt-du: Bath duration   Bt-m: Bathing materials

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

Sleep

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

- The shelter was also the sleeping place for all elephants

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

Walk

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

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

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

Social interaction

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

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

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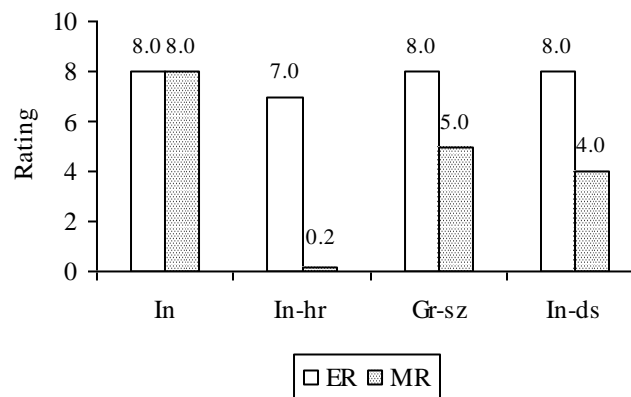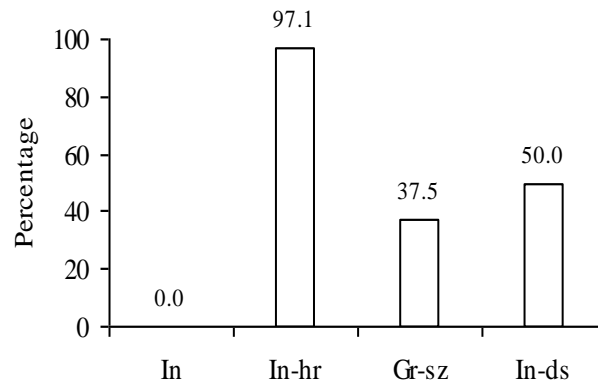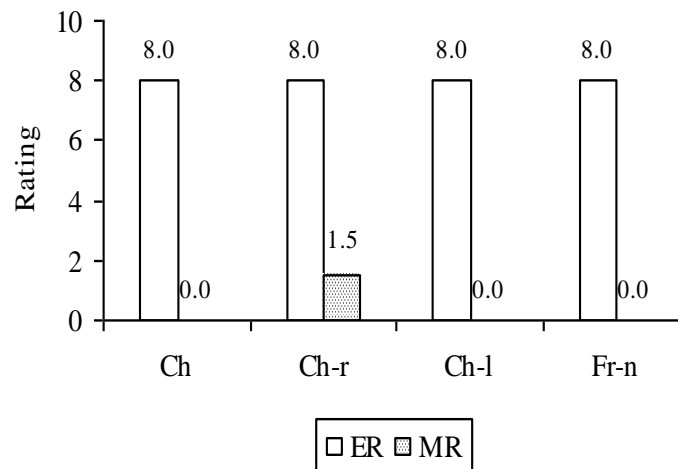

Figure 5: Comparison of E-R and M-R for 'interaction' sub-parameters

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

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

Chaining

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

- All elephants were chained by their hind legs; foreleg also chained when handler was not near elephant
- 1m chain used for tying forelegs
- None of the elephants was allowed to free range

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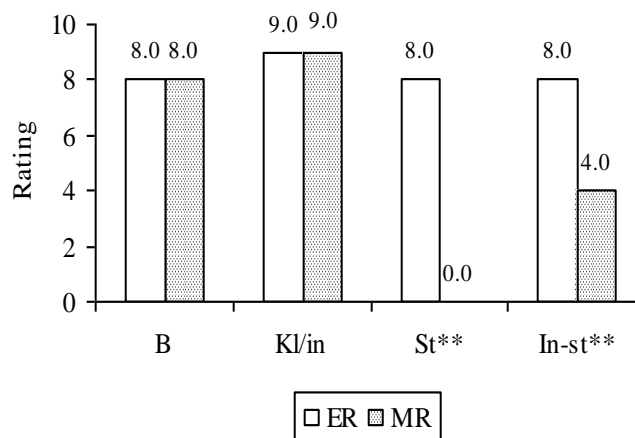

Figure 7: Comparison of E-R and M-R for 'chaining' sub-parameters
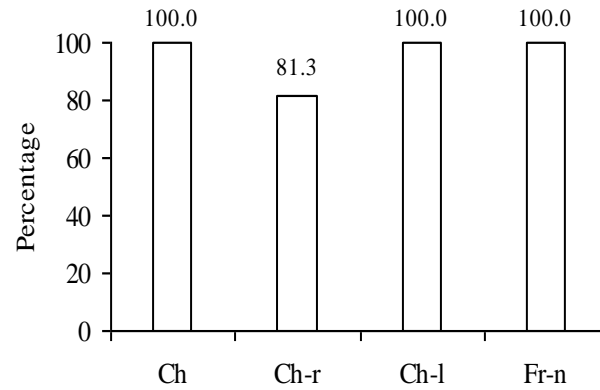
Ch: Chaining status　　　Ch-r: Chaining region　　　Ch-l: Chain length (foreleg)
Fr-n: Opportunity to free range at night

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

Observed behaviour

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

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

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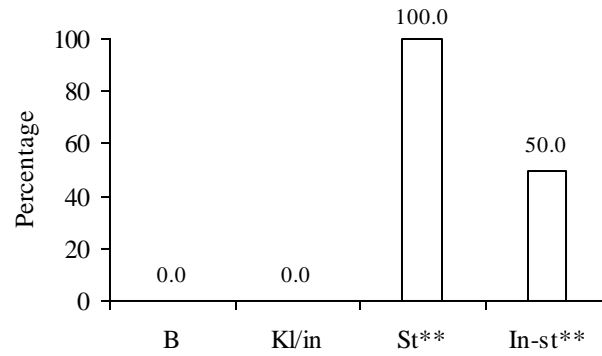

Figure 9: Comparison of E-R and M-R for 'behaviour' sub-parameters

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

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

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

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

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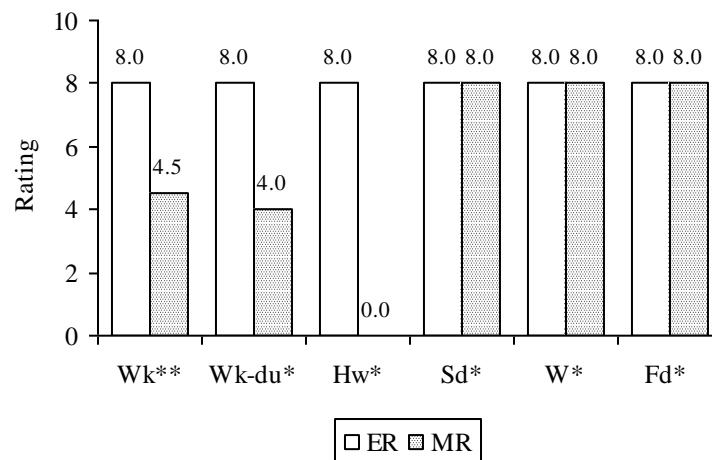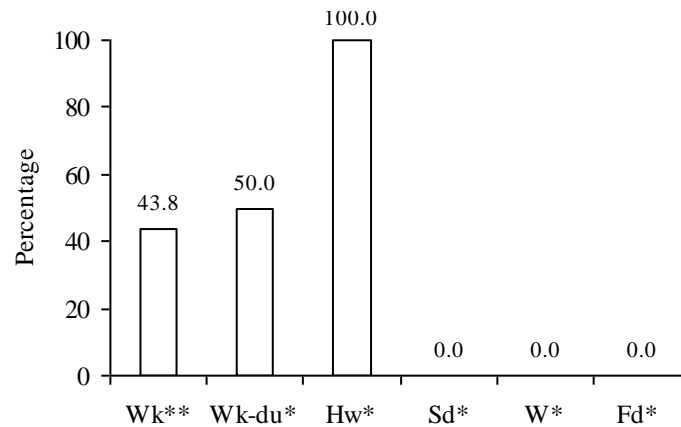

Figure 11: Comparison of E-R and M-R for 'work' sub-parameters

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

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

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

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

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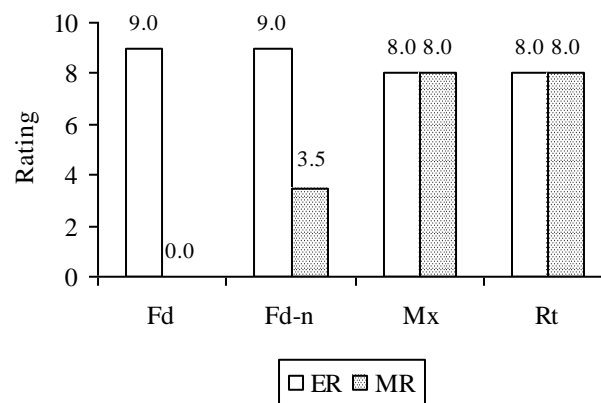

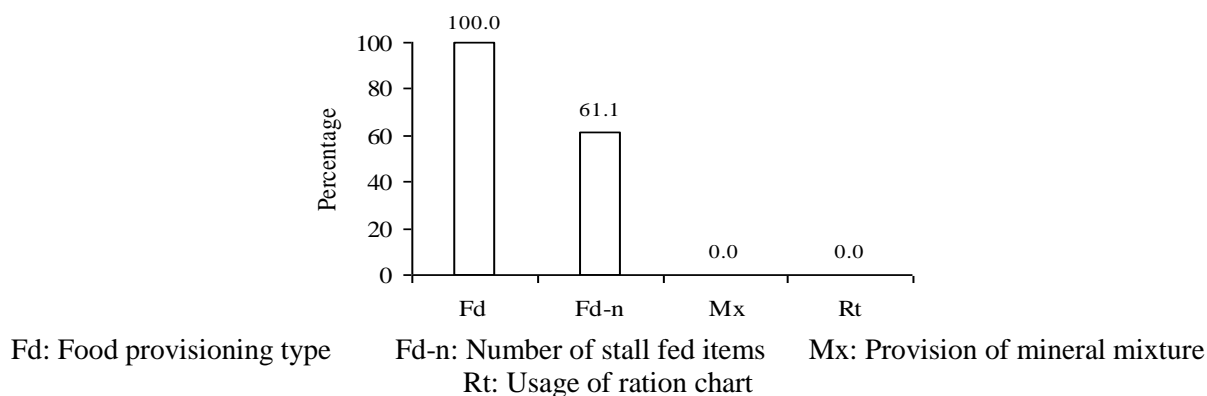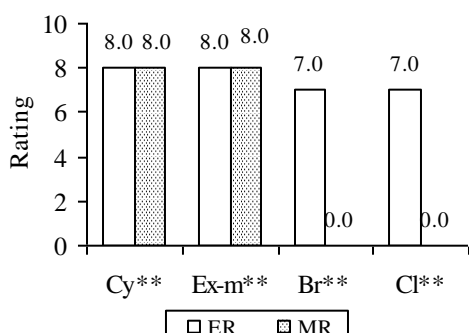Figure 13: Comparison of E-R and M-R for 'food' sub-parameters

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

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

Reproductive status

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

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

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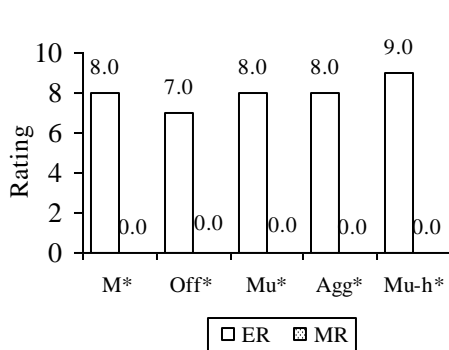

**: observed for two elephants
Cy: Occurrence of oestrus cycles   Ex-m: Exposure to males   Br: Opportunity to breed   Cl: Calf birth

Figure 15: Comparison of E-R and M-R   Figure 16: Percentage wise deviation from E-R
for female reproductive status   for female reproductive status
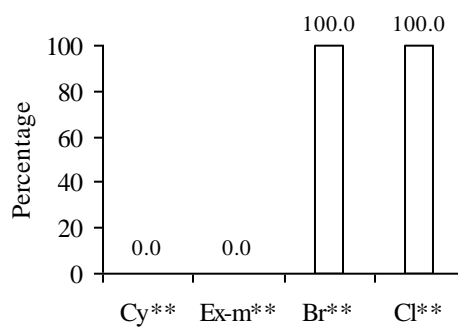
192

*: observed for one elephant

M: Opportunity to breed Off: Offspring sired   Mu: Occurrence of musth

Agg: Aggression during musth   Mu-h: Handling of musth

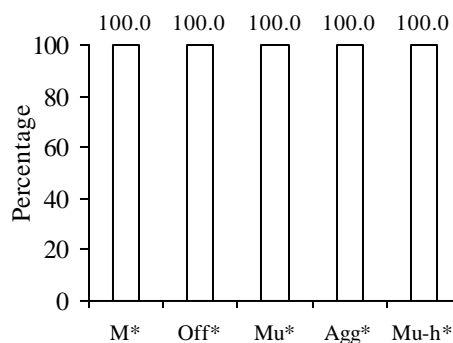Figure 17: Comparison of E-R and M-R   Figure 18: Percentage wise deviation from E-R

    for 'male reproductive status'   for male reproductive

Health status and veterinary protocol

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

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

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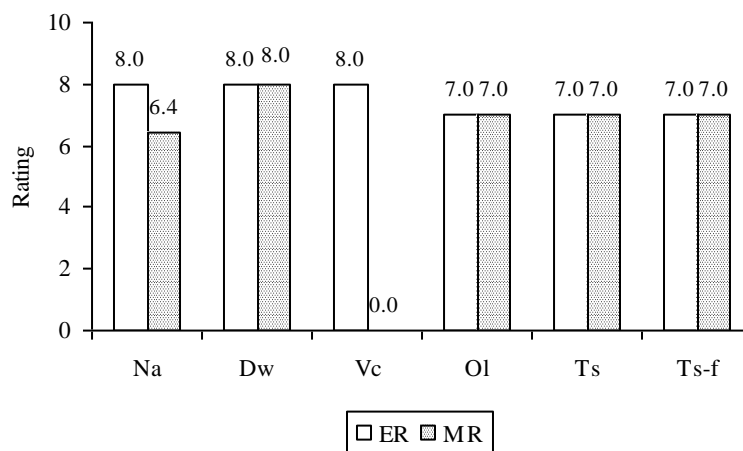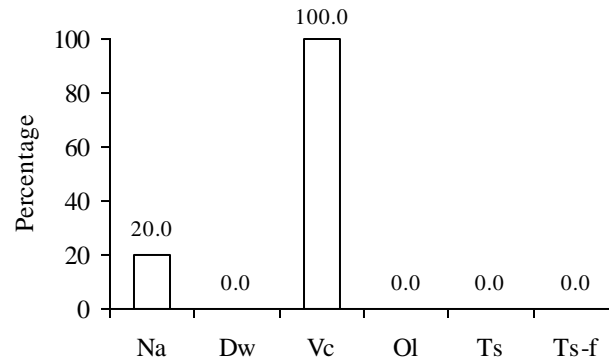

Figure 19: Comparison of E-R and M-R for 'health status' sub-parameters

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

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

Veterinary personnel and facilities

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

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

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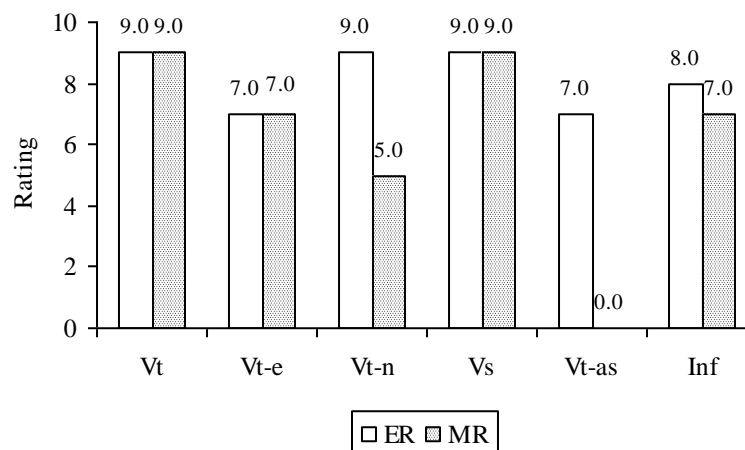

Figure 21: Comparison of E-R and M-R for 'veterinary personnel' sub-parameters
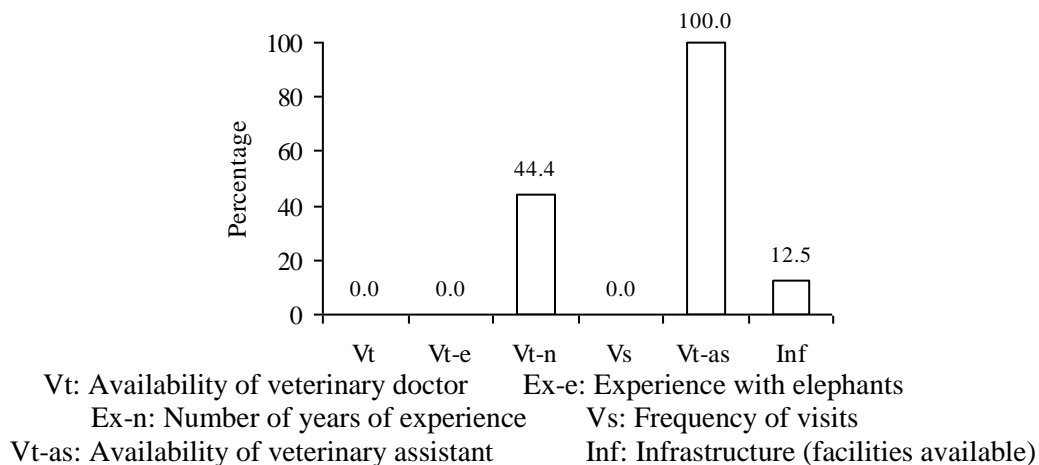
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Vt: Availability of veterinary doctor   Ex-e: Experience with elephants
Ex-n: Number of years of experience   Vs: Frequency of visits
Vt-as: Availability of veterinary assistant   Inf: Infrastructure (facilities available)

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

Handler's socio-economic status

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

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

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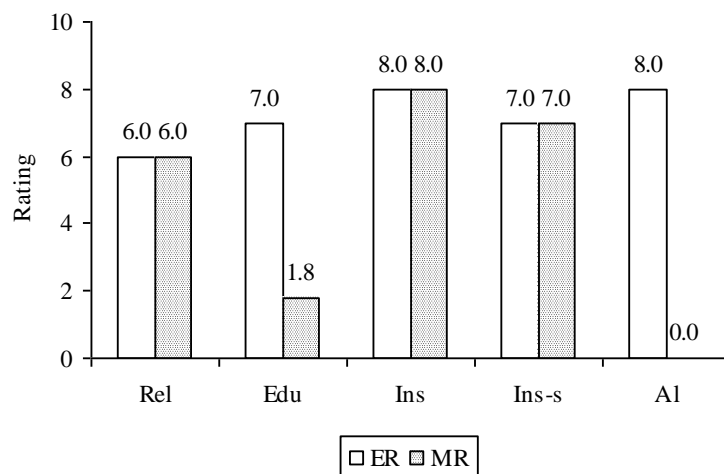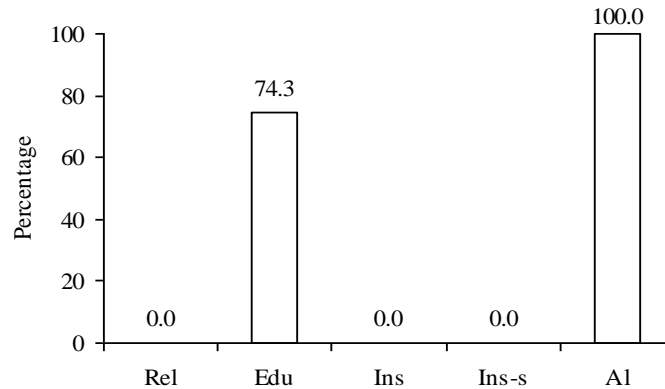

Figure 23: Comparison of E-R and M-R for 'handlers' socio-economic status' sub-parameters

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

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

Overall Welfare Status

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

N*= 58
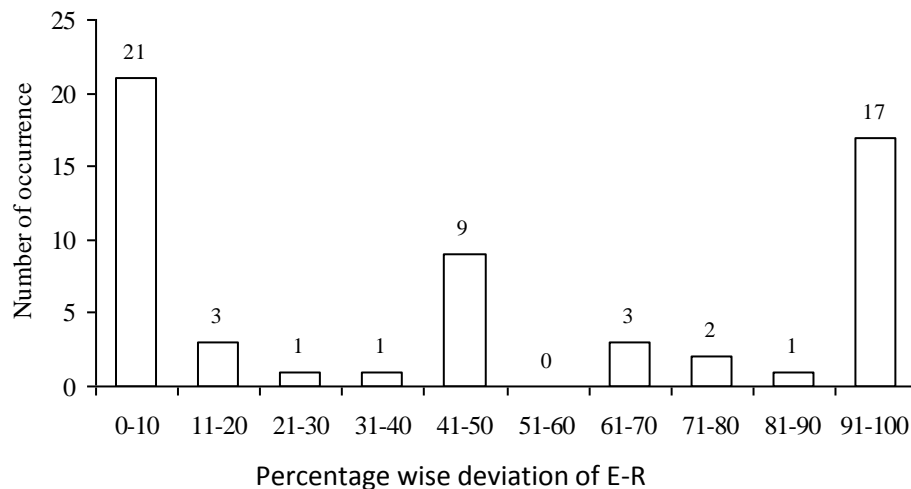
Figure 25: Distribution of Percentage wise deviation from E-R for observed parameters

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

Discussion

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

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

- The elephants were confined to a limited space of 9m X 5m for 20h of the day. Even though flooring was natural, excreta from the animals may accumulate leading to unhygienic conditions
- The absence of free movement was a major impediment to performance of species-typical activities. The distances covered by wild elephants, their activity pattern were all absent due to this reason. In contrast to their daily movements in the wild, the elephants walked for a duration of two hours only, from 10a.m. to 12noon
- Inability to move freely also restricted access to water sources
- While elephants of different ages and sex were available, they could not engage in interaction involving touch; in conflict situations, there was no opportunity to flee as they were all tethered
- Kurt and Garai (2001) report on the occurrence of stereotypy among orphaned animals in Sri Lanka, elephants which were unable to move freely due to being tied or due to poor social integration into the herd, showed stereotypic signs. In this camp, both young elephants, a male (10y) and a female (7y) showed stereotypic signs
- Wild elephants forage for most parts of a day indicating their activity pattern. All the elephants in this camp were given only stall feed, thus, not only restricting the variety of food plants available but also the movement (and hence, exercise and psychological stimulation) consequent to foraging
- Both adult females had not given birth to calves, even though they were exhibiting oestrus cycles. This was true for the male also, which exhibited signs of musth but had not sired any offspring

Mahout status

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

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

Reference

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5. Varma, S. and Prasad, D. (2008) Welfare and management of elephants in captivity—insights and recommendations, In: Welfare and management of elephants in Captivity: Proceedings of a Workshop on Welfare Parameters and their Significance for Captive Elephants and their Mahouts in India. (S. Varma and D. Prasad, eds.), pp. 54-64. Ministry of Environment and Forests (MoEF), Government of India, Compassion Unlimited Plus Action (CUPA) and Asian Nature Conservation Foundation (ANCF), Bangalore, India.

6. Varma, S., Sujatha S.R., van de Brand, J., Ganguly, S. and Shiela R., (2008) Draft concept note on welfare parameters and their significance for captive elephants and their mahouts in India, In: Welfare and management of elephants in Captivity: Proceedings of a Workshop on Welfare Parameters and their Significance for Captive Elephants and their Mahouts in India. (S. Varma and D. Prasad, eds.), pp. 17-53. Ministry of Environment and Forests (MoEF), Government of India, Compassion Unlimited Plus Action (CUPA) and Asian Nature Conservation Foundation (ANCF), Bangalore, India.

Executive summary

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Introduction

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

Objective

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

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

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

- Assess the socio-economic status of handlers

Method

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

Rating method

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

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

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

- Therefore, using the maxima given by experts as a base, a rating scale starting from zero to the particular maximum value for that parameter has been used and the data for each animal was collected, in a given regime (for example, forest camp or temple).

- In this investigation, variables which represent a common feature of the captive situations have been grouped to form a parameter. The variables have been termed sub-parameters. For example, the variables shelter type, shelter size, floor type in the shelter; all represent different aspects of the physical space provided to the elephant. Hence, they are grouped together to form the parameter "Shelter" and each constituent variable is a sub-parameter. In this investigation, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters. The Mean Rating (M-R) for a parameter is the mean of M-Rs across related sub-parameters and denotes welfare status of existing conditions on the ground for the particular parameter.

- The number of such related parameters (sub-parameters) varies for each regime.

- Results have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the parameters observed. The difference between E-R and M-R (expressed as percentage) indicates deviations from the prescribed norm.

- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) have been used to indicate the professional/ socio-economic status, of value to the handler and his elephant.

- N* refers to number of sub-parameters observed. N refers to number of individuals.

Results

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

Source

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

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

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

Purpose of keeping

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

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

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

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

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

M-R was 4.4 (SE= 2.0, N*= 6) with a deviation of 45.4% from E-R. Figures 1 and 2 give the comparative rating and Percentage wise deviation respectively, for each of the sub-parameters.
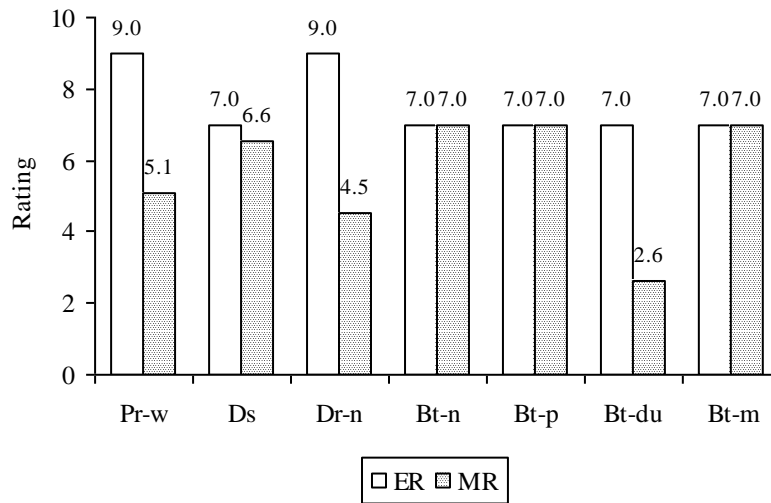
Figure 1: Comparison of E-R and M-R for 'shelter' sub-parameters
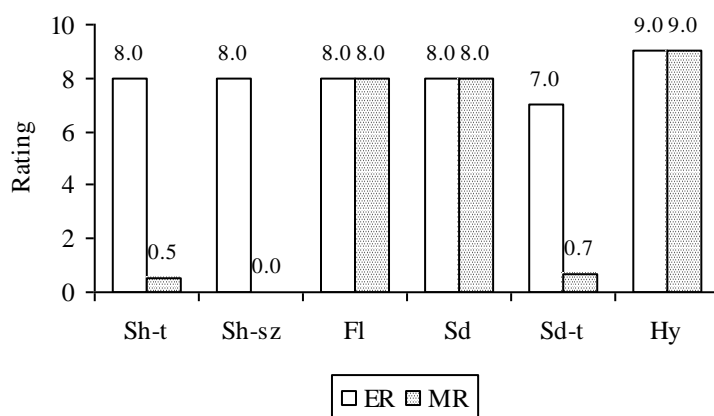
Figure 2: Percentage wise deviation from E-R for 'shelter' sub-parameters
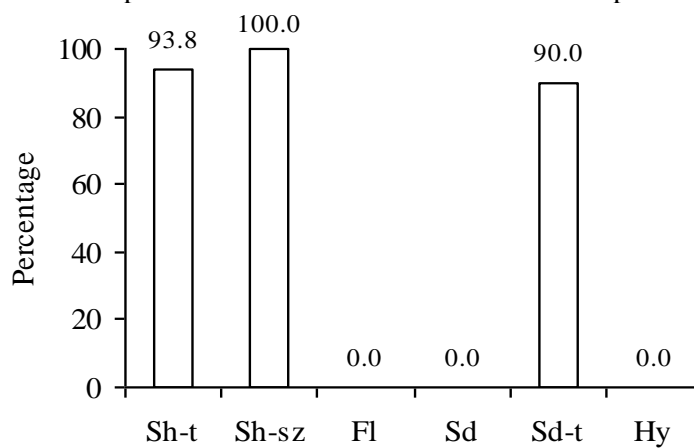
Sh: Shelter type   Sh-sz: Shelter size   Fl: Floor   Sd: Shade availability   Sd-t: Shade type
Hy: Maintenance of hygiene

Water and related parameters

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

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

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

Figure 3: Comparison of E-R and M-R for 'water' sub-parameters
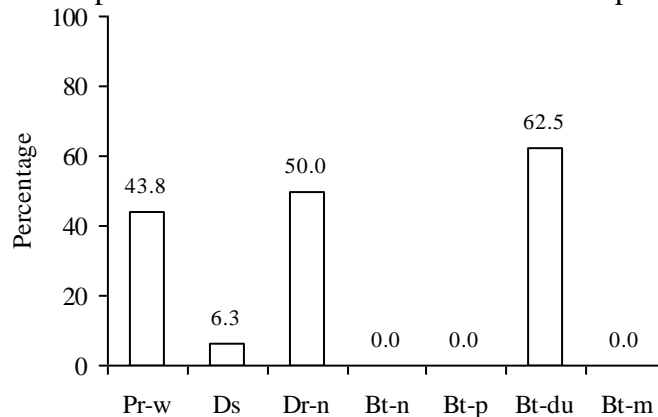
Pr-w: Availability of perennial source of running water   Ds: Distance to water source
Dr-n: Number of times drinking water Bt-n: Number of times bathed   Bt-p: Bathing place
Bt-du: Bath duration   Bt-m: Bathing materials

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

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

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

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

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

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

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

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

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

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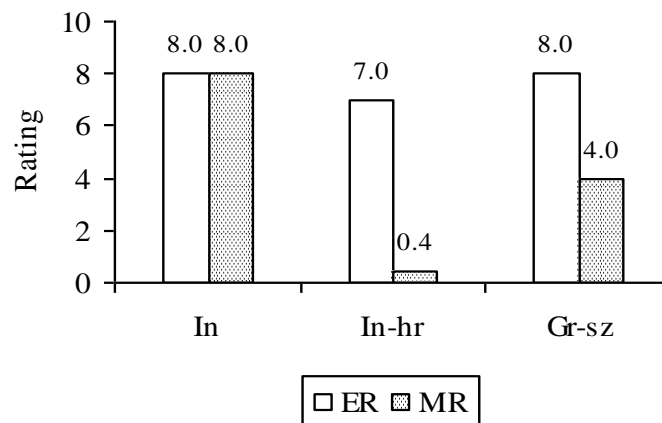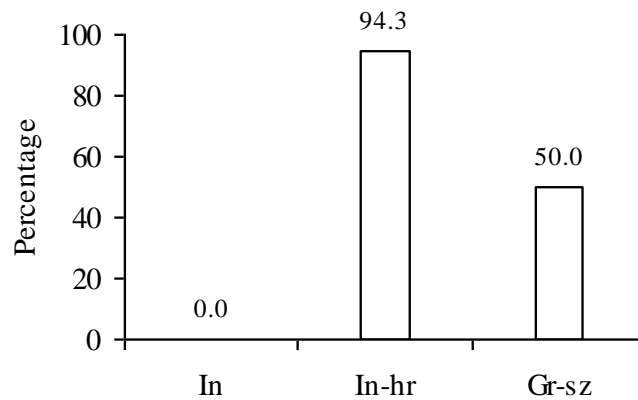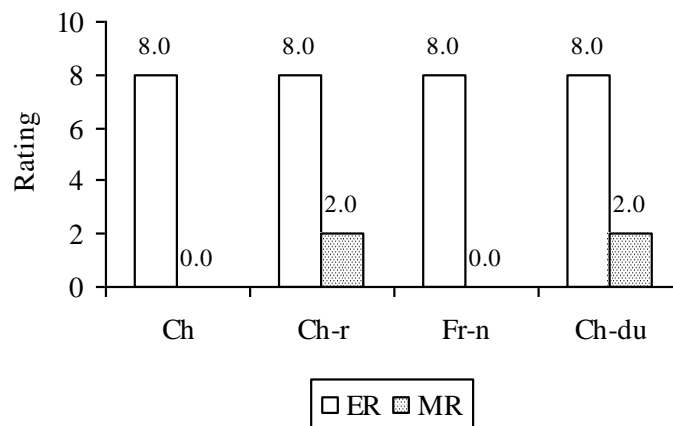

Figure 5: Comparison of E-R and M-R for 'interaction' sub-parameters

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

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

Chaining

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

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

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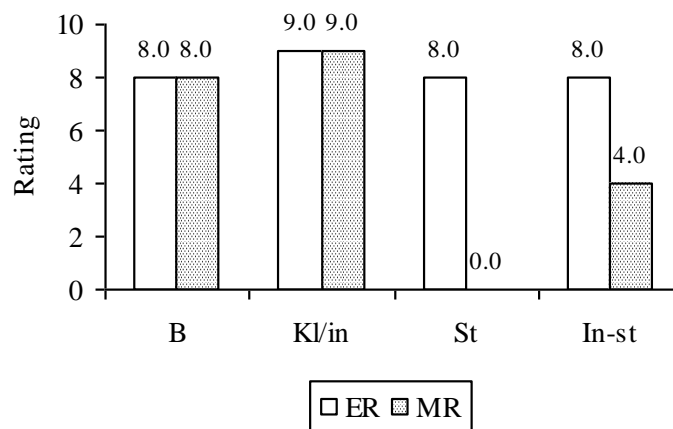

Figure 7: Comparison of E-R and M-R for 'chaining' sub-parameters

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

Ch: Chaining status   Ch-r: Chaining region   Fr-n: Opportunity to free range at night
Ch-du: Chaining duration
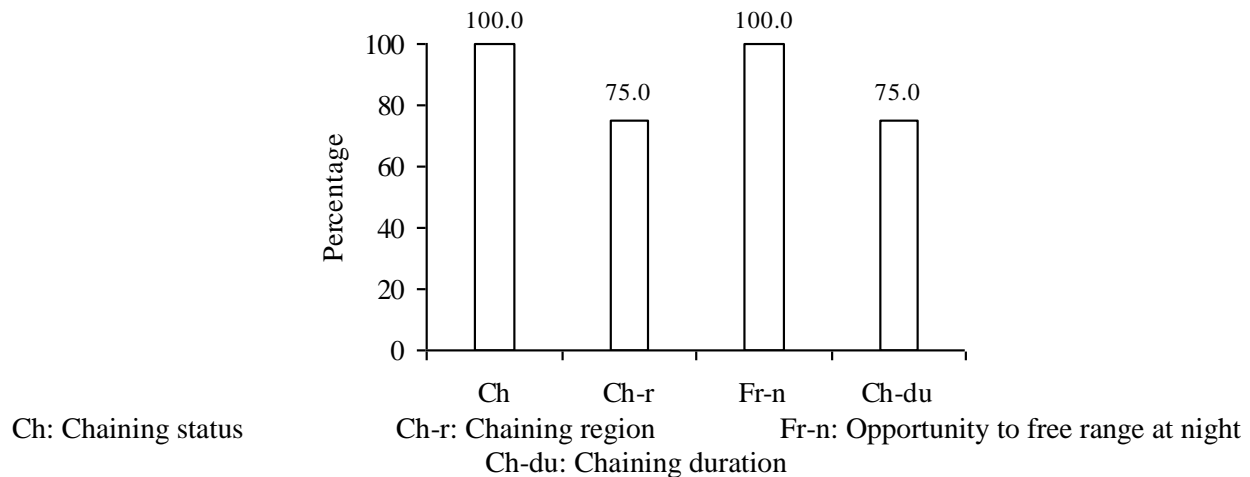
Observed behaviour

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

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

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

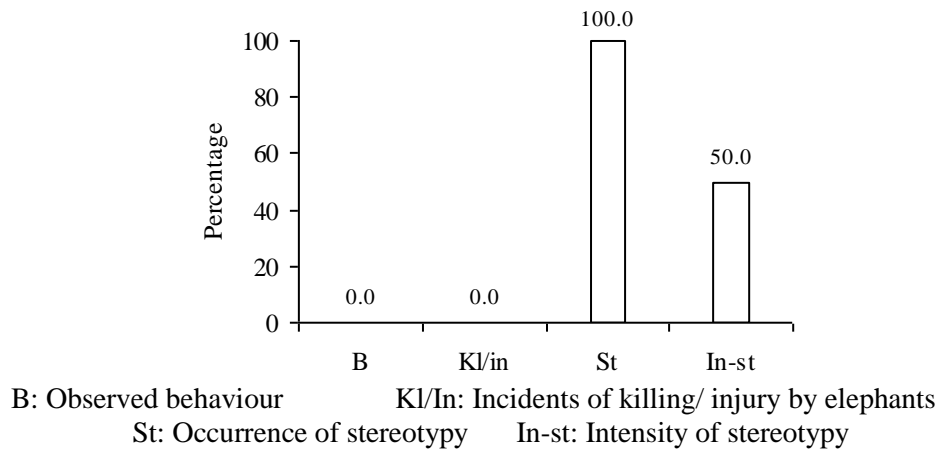Figure 9: Comparison of E-R and M-R for 'behaviour' sub-parameters

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

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

Work

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

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

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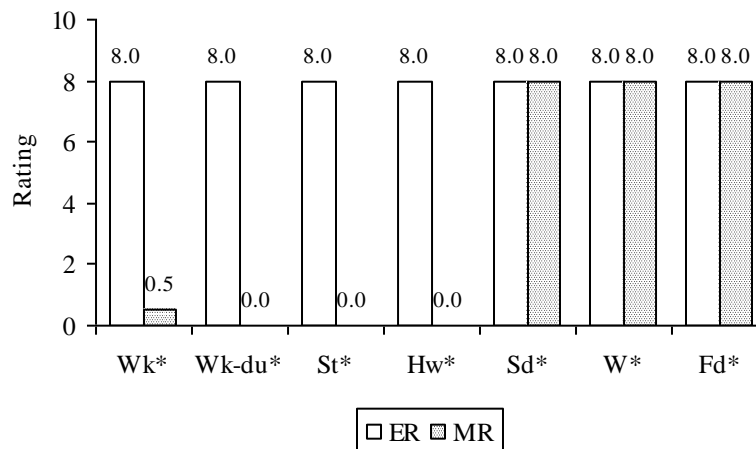

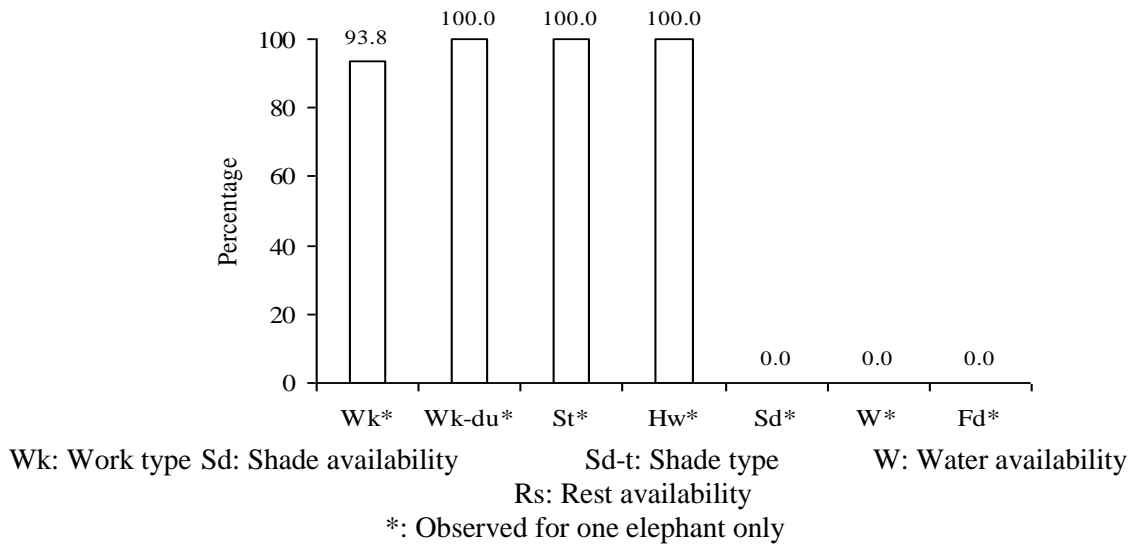Figure 11: Comparison of E-R and M-R for 'work' sub-parameters

Wk: Work type Sd: Shade availability   Sd-t: Shade type   W: Water availability
Rs: Rest availability
*: Observed for one elephant only

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

Food

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

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

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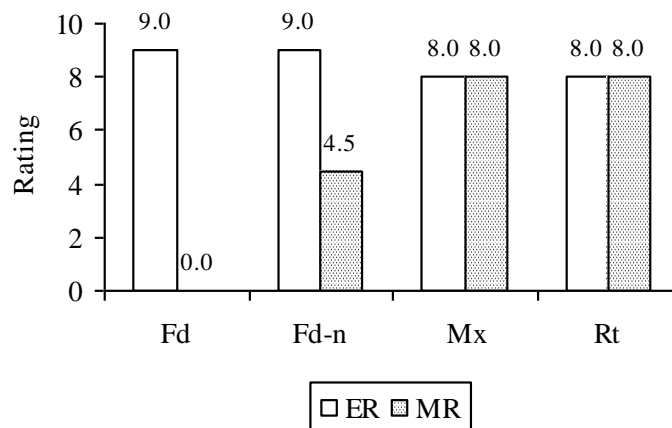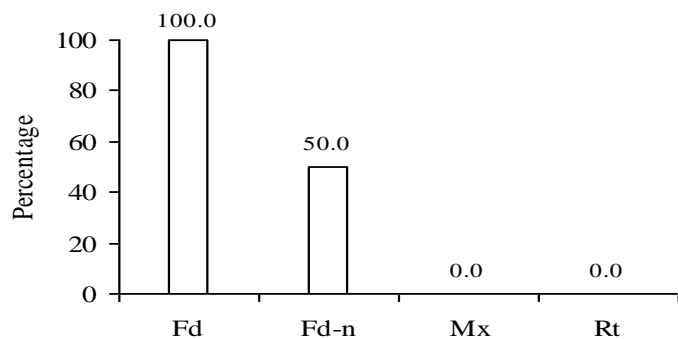

Figure 13: Comparison of E-R and M-R for 'food' sub-parameters

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

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

Female reproductive status

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

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

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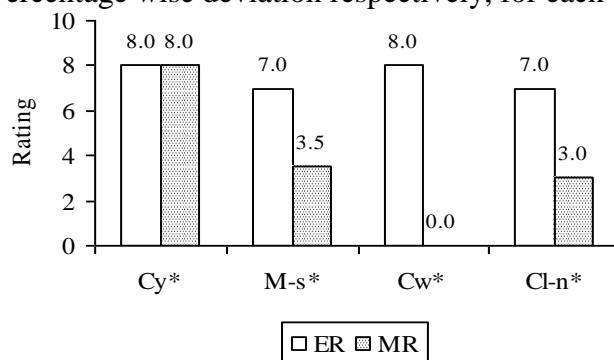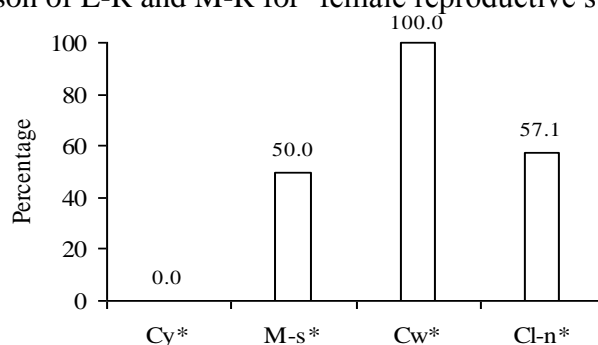

Figure 15: Comparison of E-R and M-R for 'female reproductive status sub-parameters

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

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

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Health status and veterinary protocol

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

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

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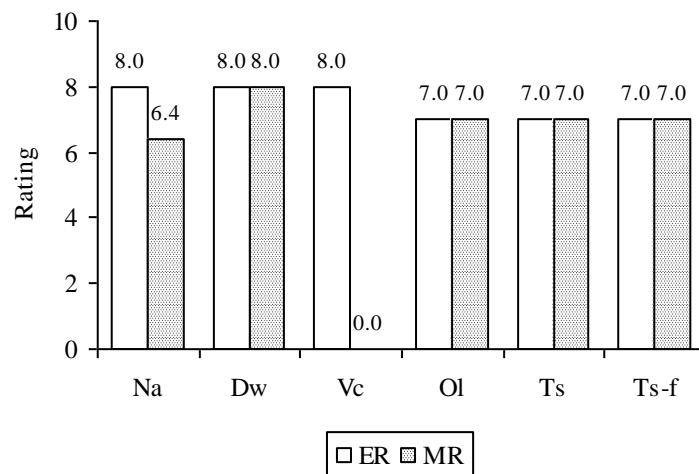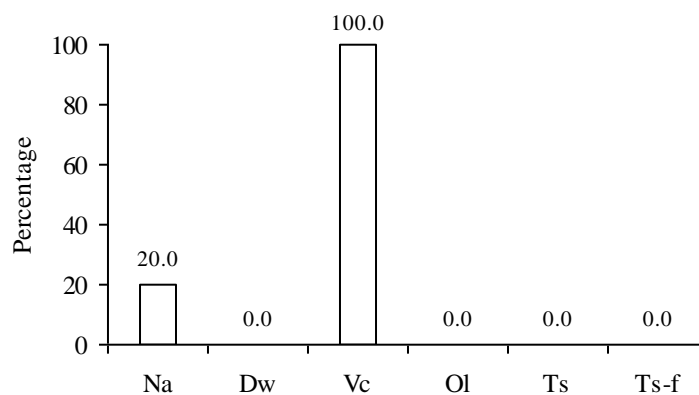

Figure 17: Comparison of E-R and M-R for 'health status' sub-parameters

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

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

Veterinary personnel and facilities

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

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

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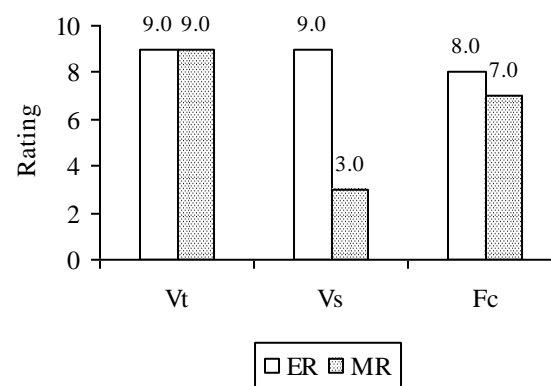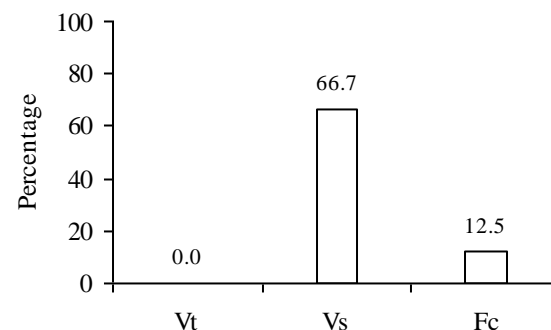

Figure 19: Comparison of E-R and M-R for 'veterinary personnel' sub-parameters

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

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

Handler's socio-economic status

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

- Ten handlers were employed for managing five elephants

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

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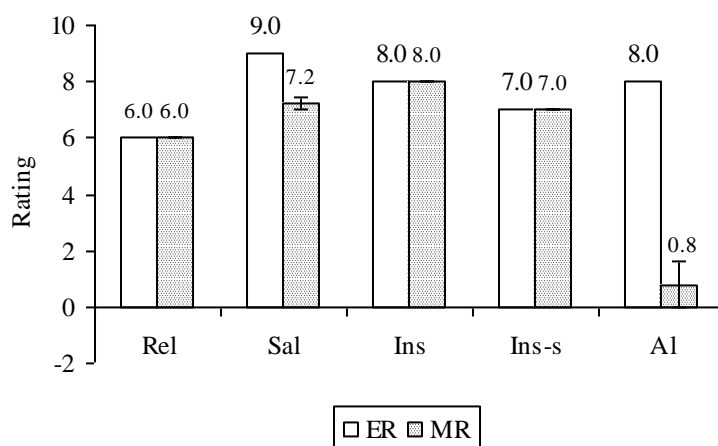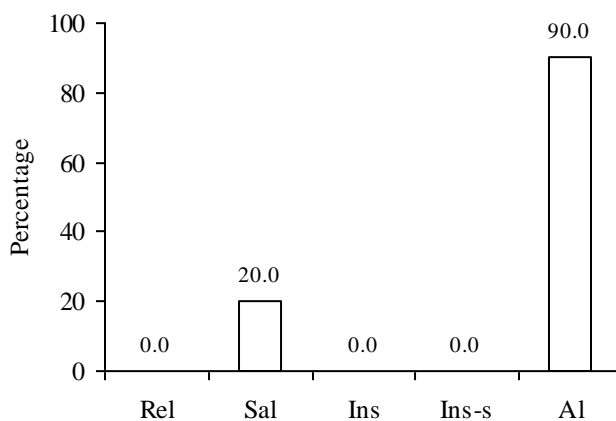

Figure 21: Comparison of E-R and M-R for 'handlers' socio-economic status' sub-parameters

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

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

Overall Welfare Status
Overall M-R for elephants, considering all observed parameters together, was 4.5 (SE= 0.5, N*= 54) showing a deviation of 44% from E-R. Figure 23 gives the distribution of Percentage wise deviation from E-R for the observed parameters. 41% of the parameters did not show any

deviation from E-R implying occurrence of near ideal features. This was, however, offset by the occurrence of a large percentage (52%, N*= 28) of the parameters accounting for a deviation of 50% or more from E-R implying greater deviation from E-R for more than half the observed parameters.
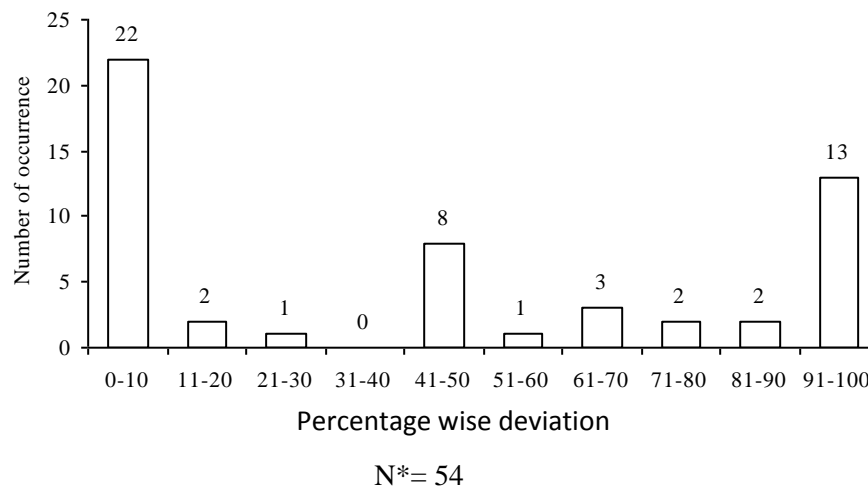

N*= 54
Figure 23: Distribution of Percentage wise deviation from E-R across all observed parameters

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

Parameters which showed 50% or more deviation from E-R:
- The elephants were provided with a natural physical environment in the form of a forest and natural flooring, but were confined to a restricted space as they were all chained for 15h/day
- Chaining restricted their access to water sources, as free range would have provided unlimited provision of water
- Sleeping place and size of the area were constrained to a 1m radius as defined by the chain length
- Provision for social interaction among the elephants was present, but was confined to a two hour duration; when not working or being trained, the elephants were not allowed to free range
- Stereotypic behaviour was observed for three of the rescued calves; Kurt and Garai (2001) report on the occurrence of stereotypies in elephant orphans in Sri Lanka with one of the observed factors being restraining elephants by tying them with ropes.
- None of the elephants was allowed to browse/ graze, all were stall fed; foraging forms a major activity for wild elephants (Sukumar, 1991) feeding a variety of vegetation, providing an opportunity for learning to feed in a social context and also engaging in species-typical activities
- With the exception of immunization, most of the prescribed veterinary care and facilities were provided for all elephants, however, there was no on-site veterinary doctor

- The adult female elephant was sent for festivals as part of its work schedule; this would involve movement away from the camp for the duration of the festival and breakage of any established bonds among the camp elephants
- The adult female elephant was 38y and had calved only once during this period showing a deviation from that observed for similarly aged wild elephants.

Handlers' status

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

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Section 6:
Captive elephants in Forest camps of Tamil Nadu

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).
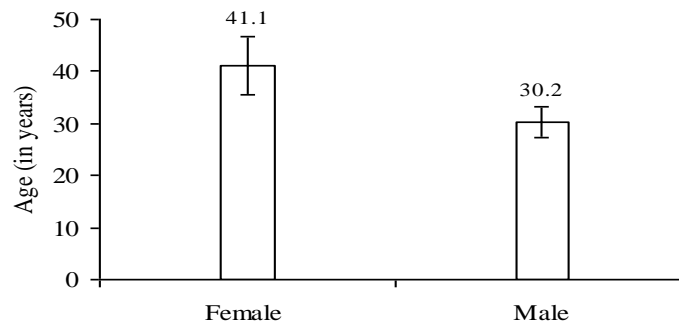
Figure 1: Mean age of FC elephants

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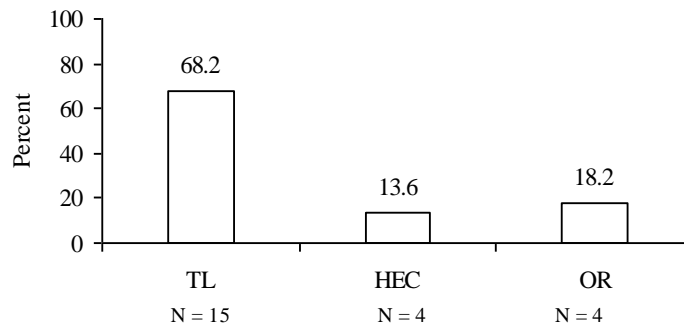
TL: Timber logging   HEC: Human-elephant conflict   OR: Orphaned

Figure 2a: Reasons for capture from wild
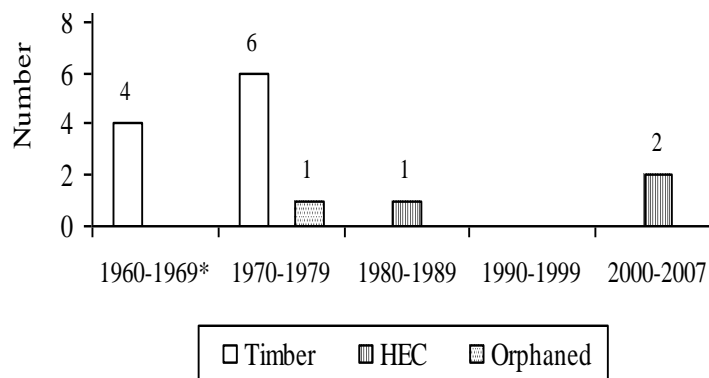
*: includes data from 1958 also- HEC: Human-elephant conflict

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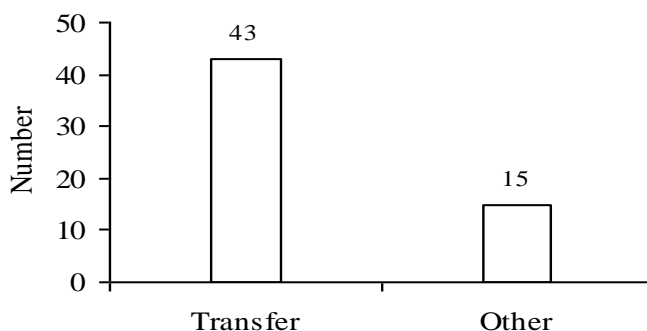
(Other: Trainees) Transfer in first bar (of graph) refers to mahout

Figure 3a Reason for change in mahout per elephant
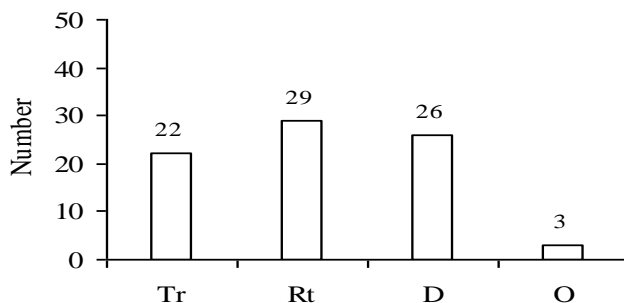
Tr: Transfer   Rt: Retired   D: Death   O: Others
Other: Transfer of elephants/ death/ calves growing up/ calves being brought in)

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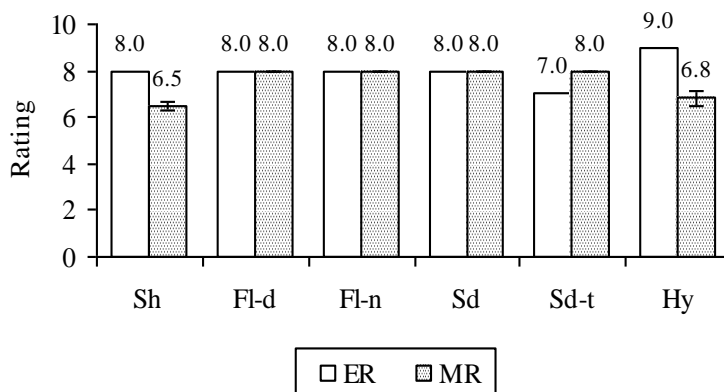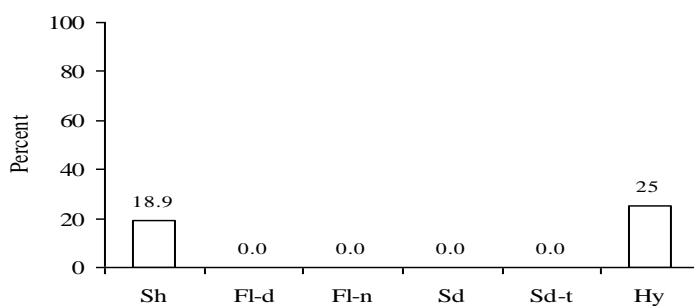
Figure 4a: Comparison of M-R and E-R for 'shelter' sub-parameters

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).
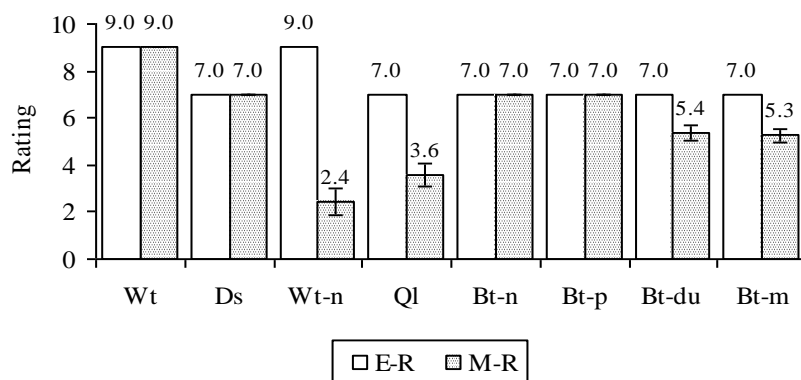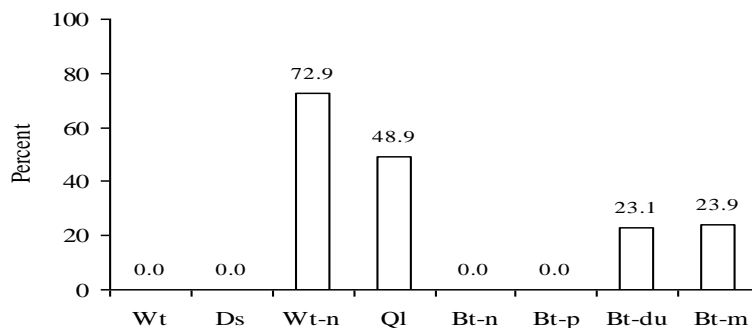

Figure 5a: Comparison of M-R and E-R for water sub-parameters

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 (umber 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).
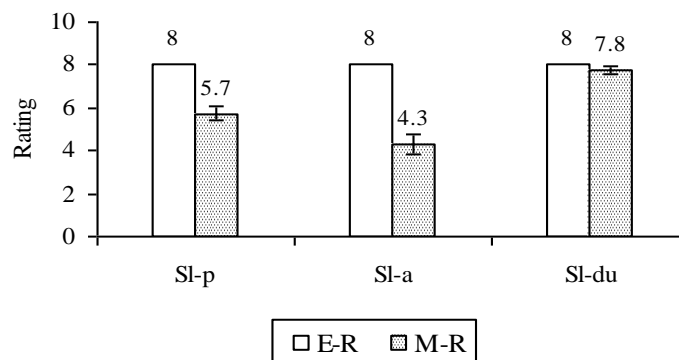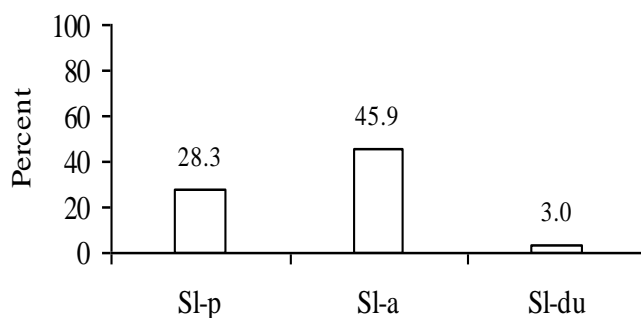

Figure 6a: Comparison of M-R and E-R for 'sleep' sub-parameters

Sl-p: Sleeping place   Sl-a: Sleeping areaSl-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).
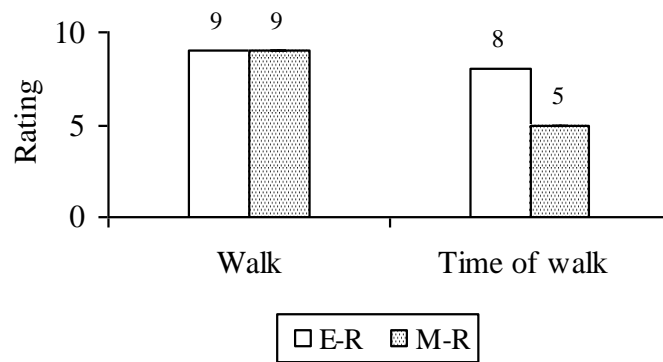
Figure 7: Comparison of M-R and E-R for 'walk' sub-parameters

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).
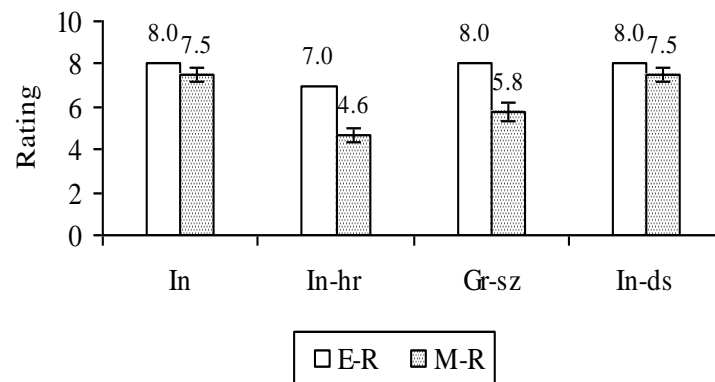

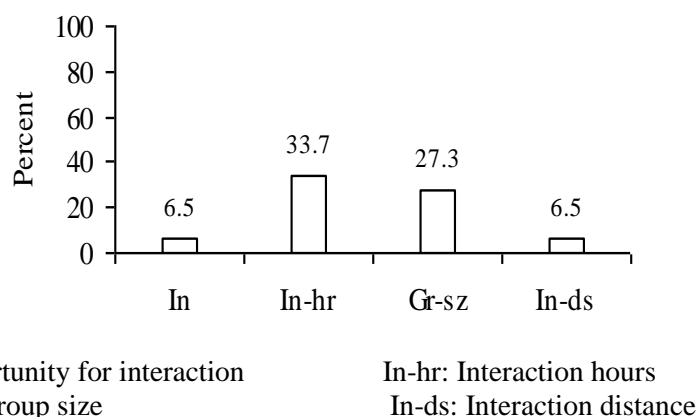Figure 8a: Comparison of M-R and E-R for 'social interaction' sub-parameters

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).
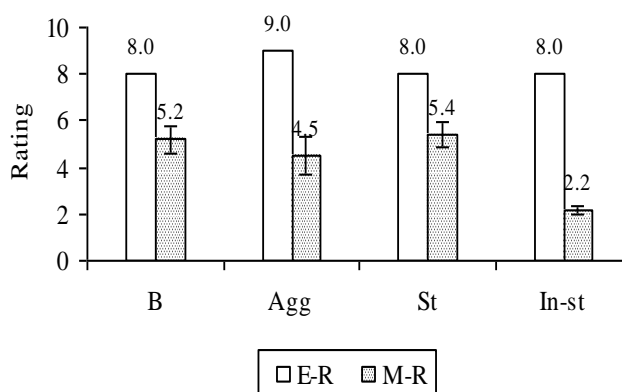

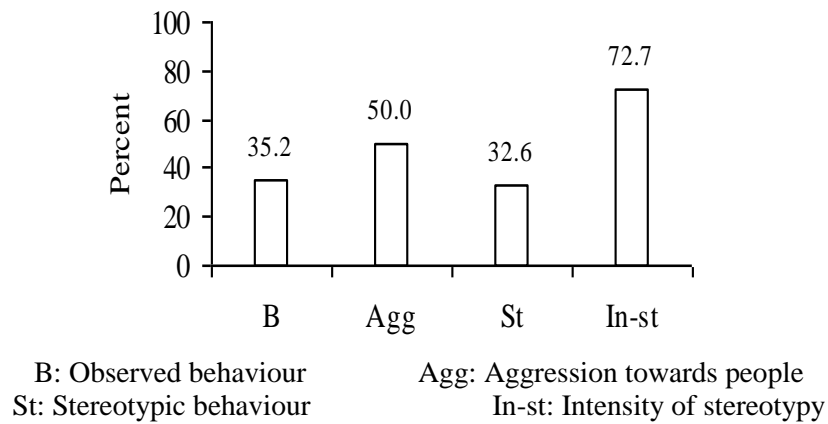Figure 9a: Comparison of M-R and E-R for 'behaviour' sub-parameters

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).
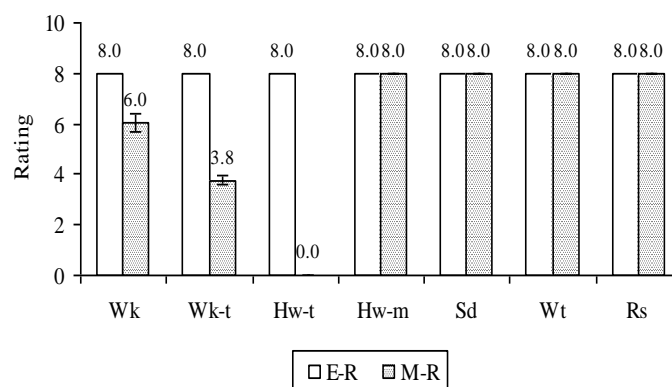

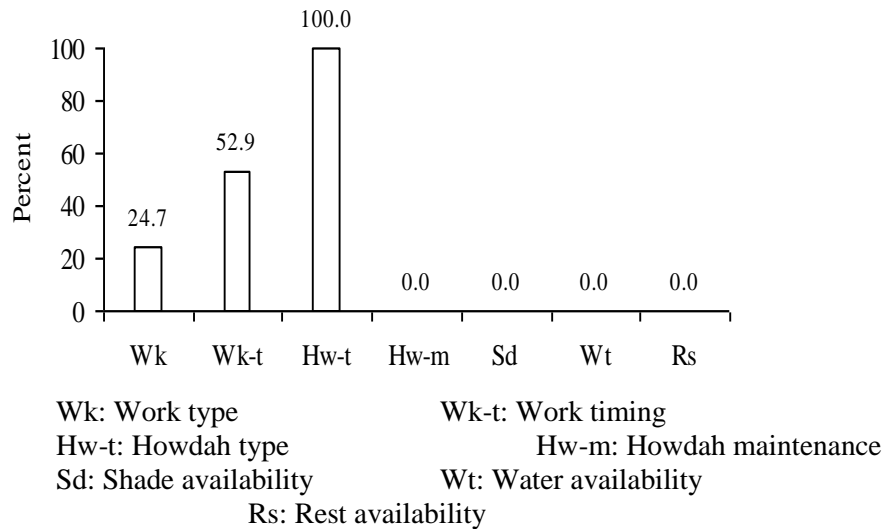Figure 10a: Comparison of M-R and E-R for 'work' sub-parameters

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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).
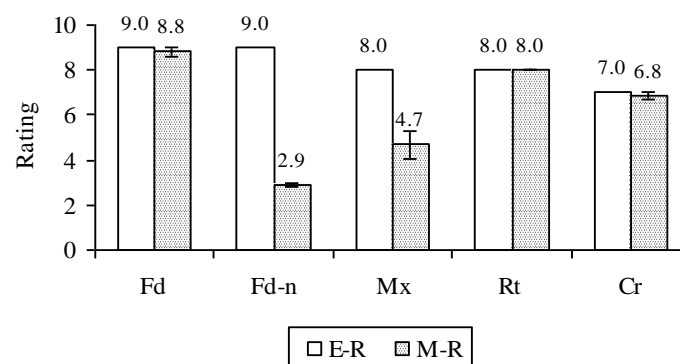

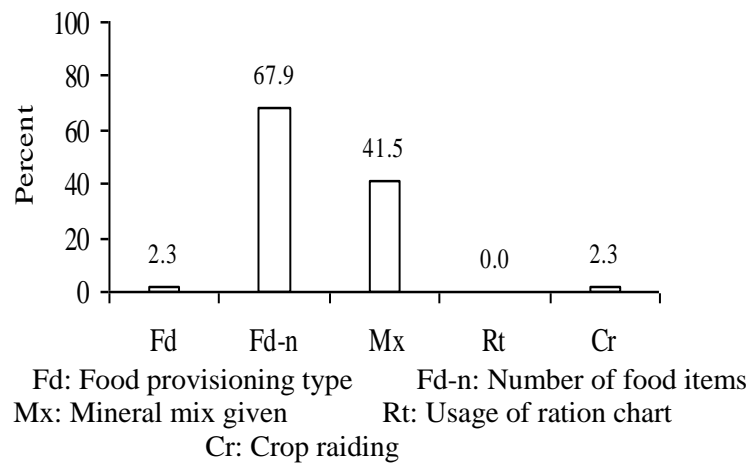Figure 11a: Comparison of M-R and E-R for 'food' sub-parameters

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).
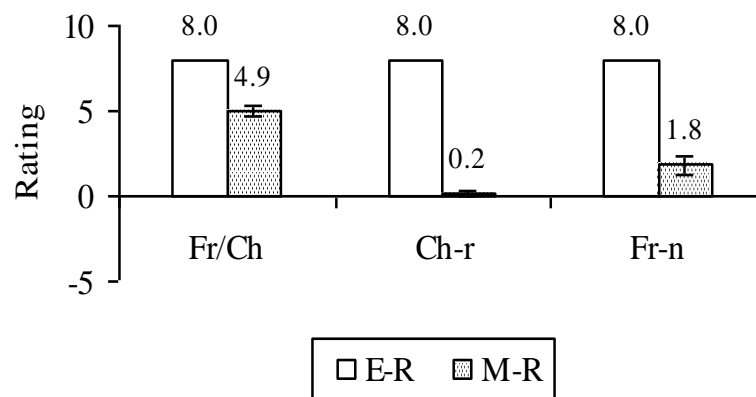

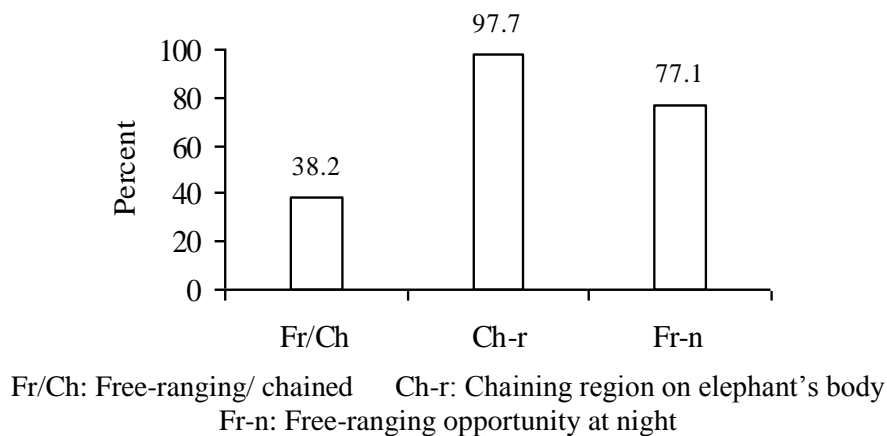Figure 12a: Comparison of M-R and E-R for 'chain' sub-parameters

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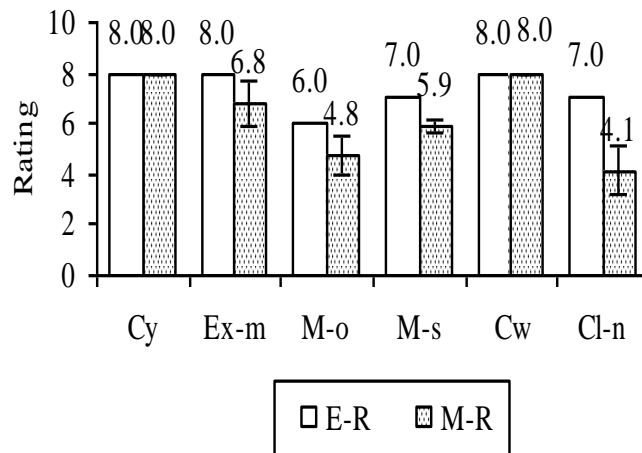
Figure 13a: Comparison of M-R and E-R for 'female reproductive status' sub-parameters
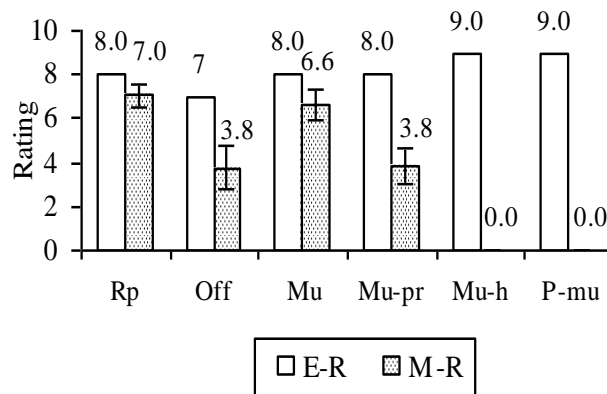

Figure 13b: Comparison of M-R and E-R for 'male reproductive status' sub-parameters
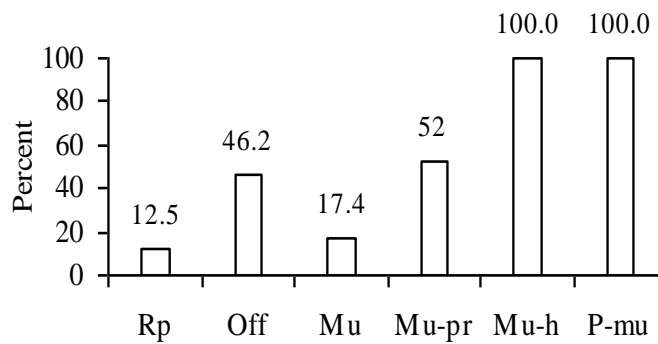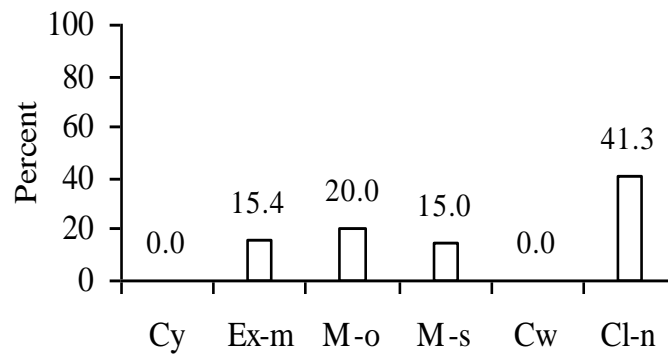

Figure 13c: Percent deviation from E-R for male reproductive

status

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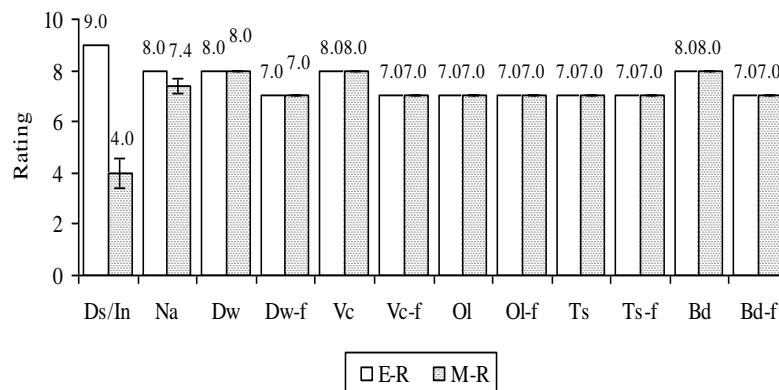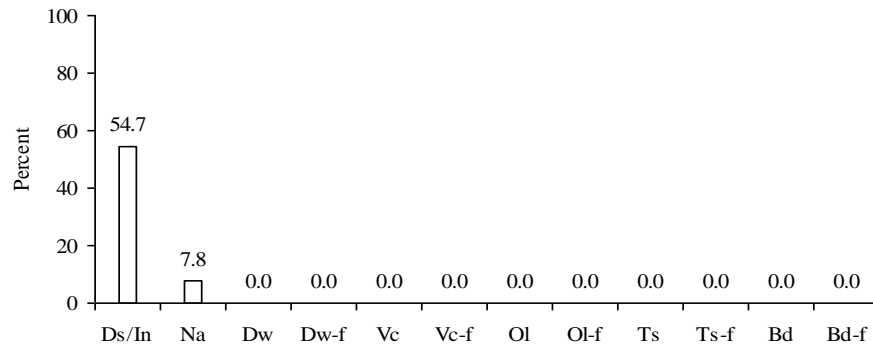

Figure 14a: Comparison of M-R and E-R for 'health and veterinary' routine sub-parameters

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).
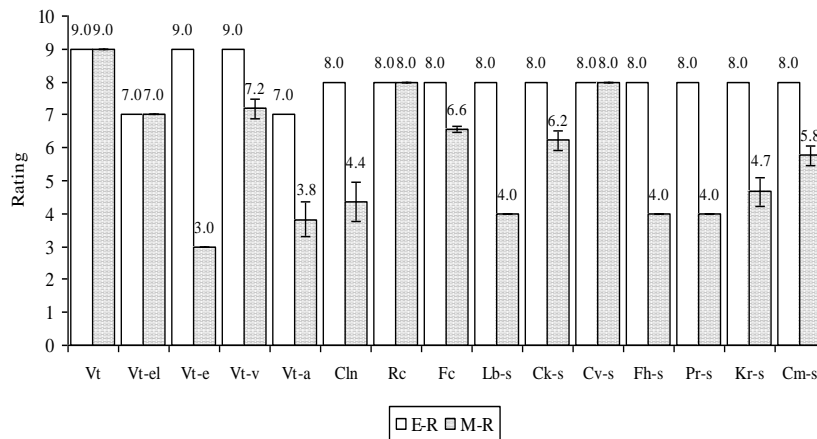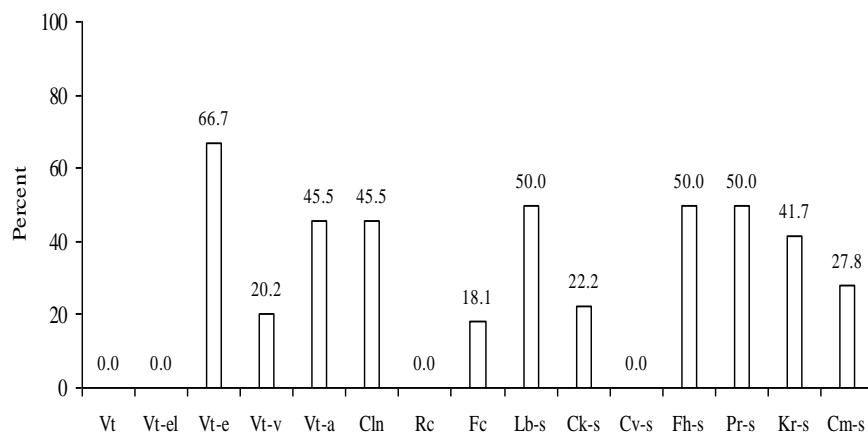

Figure 15a: Comparison of M-R and E-R for 'veterinary personnel and infrastructure' sub-parameters

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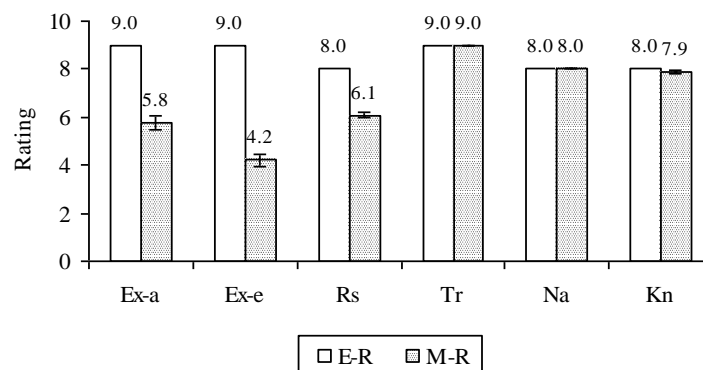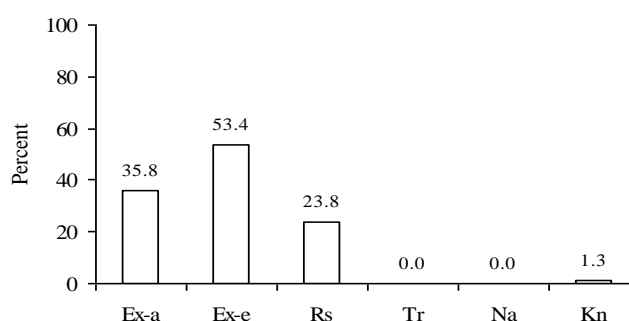
Figure 16a: Comparison of M-R and E-R for 'professional experience' of handlers

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).
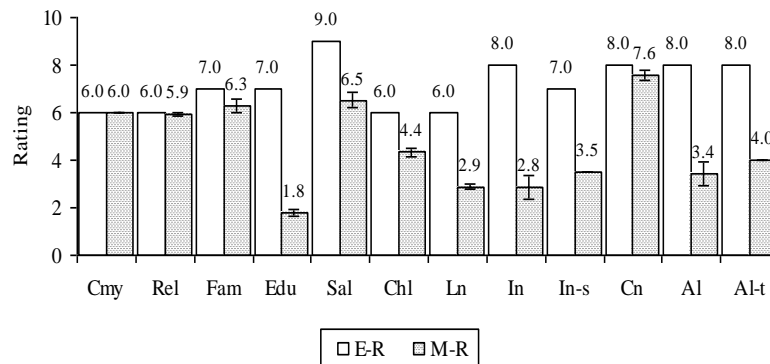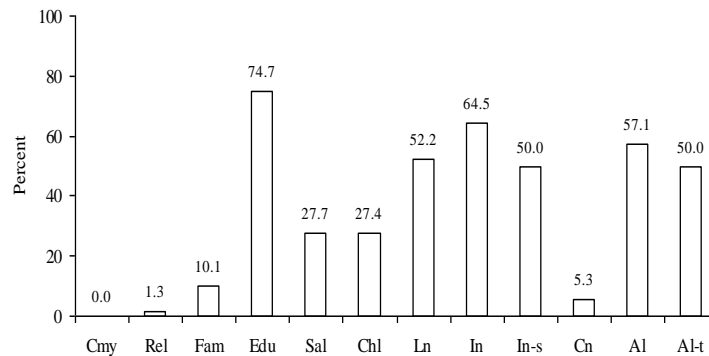

Figure 17a: Comparison of M-R and E-R for 'socio-economic' status of handlers

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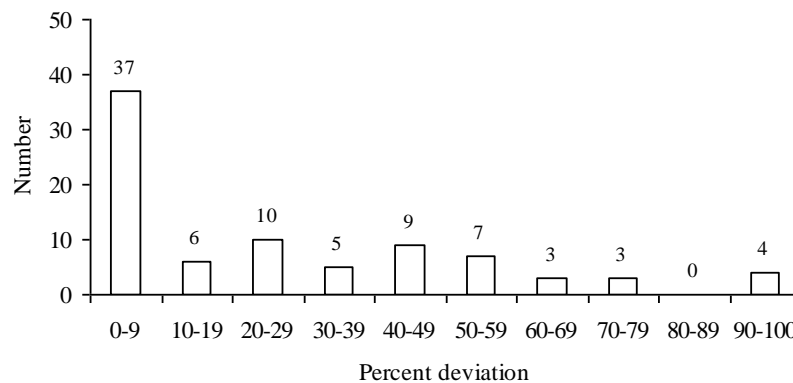
Figure 18: Distribution of percent deviation from E-R across all parameters

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 7:
Captive Elephants in Forest camps of West Bengal

EXECUTIVE SUMMARY

Captive elephants in West Bengal come under two different administration such as forest based camps run by the forest department (FD) and circuses. Of 83 captive Asian elephants with the FD, 58 are in Jaldapara Wildlife Sanctuary (WLS), 15 in GurumaraGorumara, 8 in Buxa and 2 in Sukhna. There are three circuses operating in Kolkata (West Bengal) accounting for a total of 15 elephants.

About seventy percentage of elephants belong to forest department are kept in Jaldapara Wildlife sanctuary, in West Bengal, in addition to wild elephants, the sanctuary is home to a number of captive elephants maintained by the forest department. Elephants belonging to circus are usually not stationed in this state and difficult to sample them. Given this, it is assumed investigation on captive elephants in Jaldapara Wildlife Sanctuary may reflect the overall status of captive elephants of the state.

With this background, this investigation aims to assess the welfare status of elephants in Jaldapara Wildlife Sanctuary, by considering features pertaining to the physical environment, social, psychological and reproductive factors, and health issues. It also assesses the professional experience and socio-economic status of handlers (mahouts/ cawadis) as they are integral to the any captive elephant keeping system

Welfare has been measured by comparing captive conditions with those observed in the wild in terms of the physical, social, psychological, reproductive and health aspects. A rating scale from unsuitable conditions to suitable conditions was used to assess the welfare status of captive elephants and their handlers.

Forty-two elephants were observed, of which 26 were females and 16 males. Age ranged from a new-born calf to 56 years for females, from 3 to 34 years for males. Fourteen percent of the elephants were constituted by calves (less than five years of age).

Captive born elephants constituted 68% of the elephants whose source was known, 71% of the captive born elephants were sired by wild males; thirteen elephants, all females, had been purchased from the Sonepur Mela in Bihar. Mean Rating (M-R) for source of elephant was 5 implying a deviation of 24% from Expert Rating (E-R).

Forty six percent of elephants were used for tourism related work and comparable percentage (24% and 30%) were used for tourism + patrolling and patrolling + fodder collection. M-R was 3.8 showing a deviation of 52.3% from E-R.

All the elephants were kept in forest conditions, the animals were chained in the open when not working and natural earthen flooring was available; M-R for shelter type was 0.5 with a deviation of 93.8% from E-R. M-R for flooring was 8.0 with no deviation from E-R.

Tap water and rivers/streams were the combined source for 90% of the elephants. Distance to the river varied from 100m to 2.5 km. Elephants were bathed in the river/ stream; frequency was once-a-day; duration was 1-1.5h. M-R was 4.3 showing a deviation of 45.7% from E-R.

Forty one percent of elephants were allowed to interact with other elephants in the camp. Duration of interaction ranged from 6- 24h/day and number of individuals ranged from 1-3. M-R was 4.5 implying a deviation of 43.8% from E-R.

Ninety percent of elephants were chained when not working and 54% elephants were hobbled. Six female elephants (aged between 25-50y) and five male elephants (aged between 11-34y) were fitted with spiked chains. None of the elephants was allowed to free range at night. M-R was 2 with a deviation of 78.7% from E-R.

Seventy one percent of elephants were quiet and reliable, 22% were reported to be aggressive towards people/ other elephants, of these only one was a female and the rest were males. Two adult elephants, a 34y old male and a 50y old female, had both killed their handlers. Of the ten elephants showing stereotypy, six were females and four were males. M-R was 6 with a deviation of 23% from E-R.

Sixty seven percent of elephants were used for work, elephants were aged between 8 to 56 yrs. Work type was patrolling and providing rides for tourists or fodder collection. Number of people carried for rides ranged from 3-8; maximum distance covered with weight was 5-10km and howdah weight was less than 50kgs; howdah consisted of soft *gunny* bags. M-R was 4 implying a deviation of 47.6% from E-R.

All elephants were allowed to forage as well as provided stall feed. Foraging, however, was limited to those occasions when the elephants were worked (patrolling) or taken into the forest for fodder collection. Stall feeding duration ranged from 3-8h; included fodder was *Hogla* (*Typha angustifolia*), *Prundi* (*Alpinia nigra*), *Nol* (*Arundo donax*), *Banaspati*, *Bhutta grass* (*Tripsacum laxum*), *malsa*, *Madhua* (*Saccharum arundinaceum*), *Khagra*, *Dhadda*, (*Saccharum narenga*) *Chepti* and cooked food such as rice, pulses, *jeera* (cumin seeds), *methi* (fenugreek seeds) and salt. M-R was 4 with a deviation of 53% from E-R.

Only two adult female elephants were not exposed to males. Wild males were the male source for all the matings. Number of calves born ranged from 0 to 8 per female; two premature births were reported for a 25 years old female, both calves did not survive. M-R for female reproductive status was 5 indicating a deviation of 25.2% from E-R.

None of the observed adult males was exposed to females, none had sired any offspring and only one male of the eight exhibited musth; had killed a person during musth. M-R was 0.3 with a deviation of 95.8% from E-R.

Foot problems such as toe nail cracks, foot rot, lameness, or arthritis was observed with foot problems noticed in 29% of the observed elephants; gastro-intestinal problems were observed for a 50y old female elephant. Body measurements were taken annually for all elephants except a new-born calf and a 35y old female. M-R was 6 with a deviation of 28% from E-R.

All elephants had access to a veterinary doctor who had 2 years experience in treating elephants. Frequency of visits was weekly and a mobile veterinary clinic with minimum facilities was

available; staff quarters, cooking shed, provisions shed were provided. M-R was 5 with a deviation of 40% from E-R.

Professional experience of mahouts in this profession was 12 years and with a specific camp elephant was 9 years and it ranged from six months to 30 years. Number of elephants each handler had worked with ranged from 1-5. M-R was 6 showing a deviation of 32.1% from E-R.

Seventy two percent of handlers did not have relatives working in this profession and 67% of handlers were educated, none had studied upto the 10th class. Mean annual salary drawn was Rs.34,000; ranging from Rs.16,800 to Rs.84,000/-. Fifty six percent of handlers were not covered by insurance and 61% of the handlers consumed alcohol; most was consumed after work. M-R was 3 indicating a deviation of 51.1% from E-R.

Overall M-R, considering all observed sub-parameters together, was 4.3 implying a deviation of 42% from E-R and 42% of all parameters across physical, social and reproductive features, showed a deviation of 50% or more from E-R.

Introduction
Under two different management regimes such as Forest camp and Circus, captive elephants in West Bengal are managed. The Forest Department has a total of 83 elephants under its management and 58 elephants are in Jaldapara Wildlife Sanctuary (WLS), 15 are in Gurumara, 8 elephants are in Buxa and 2 in Sukhna. There are three circuses operating in the State accounting for a total of 15 elephants. About seventy percentages of elephants belong to forest department are kept in Jaldapara Wildlife sanctuary, in West Bengal. Elephants belonging to circus are usually not stationed in this state and difficult to sample them. Given this it is assumed investigation on captive elephants in Jaldapara Wildlife Sanctuary may reflect the overall status of captive elephants of the state.

Jaldapara Wildlife sanctuary, in West Bengal, was notified as a protected area in 1940-'41; it covers an area of 216km^2, harboring diverse wildlife. In addition to wild elephants, the sanctuary (termed Forest Camp— FC in this report) is home to a number of captive elephants maintained by the state forest department. These elephants, wild caught/ rescued from the wild/ born in captivity, are trained and then used for work such as timber hauling/ for tourism.

Objective
Conditions provided in captivity for elephants will not be similar to those experienced in the wild as living conditions are controlled by people. This report aims to:
- Assess the welfare status of elephants, in the FC, by considering features pertaining to the physical environment, social, psychological and reproductive factors, and health issues
- Assess the professional experience and socio-economic status of handlers (mahouts/ cawadis) as they are integral to the any captive elephant keeping system

Method
The biological and ecological needs of captive elephants, which are no different from those of wild elephants, are integral to their welfare; these animals have not been selectively bred in captivity to modify their behaviour in consonance with those of human needs. Hence, welfare has been measured by comparing captive conditions with those observed in the wild in terms of the physical, social, psychological, reproductive and health aspects. In addition, veterinary care has also been included, as poor or inadequate care leads to poor health conditions.

The existing conditions have been rated in terms of their suitability to elephants. The existing situation for the elephant/s was surveyed through observation of the animal/s and interview with relevant personnel (Figures 1a, b, c and d).

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

- The experts, based on their concept of importance of a particular parameter to an elephant, developed a rating for each parameter. For example mean expert rating of 8.0 (SE= 0.5, N=29) for a parameter 'floor' and 9.0 (SE=0.4, N=31) for 'source of water' was arrived at from the ratings suggested by each expert by averaging across all the experts' values.
- A mean rating for each parameter, across all the participating experts, has been used as the Experts' Rating (E-R) which represents the importance attached to a parameter i.e., for a parameter with 8.0 as the maximum value, only 2.0 (25%) deviation and parameter with maximum value 9.0 only 1.0 or 10% from the prescribed norm is considered acceptable.
- For example, if an elephant is exposed only to natural flooring, the animal receives a rating of 8 and for entirely unnatural flooring the value is 0; if the animal is exposed to both natural and unnatural flooring, the value is 4 (as 8+0/2= 8/2= 4). If an elephant is exposed to a natural water source, such as a river, it receives a value of 9; if the source of water is large lakes or reservoirs, it gets 4.5. A value of 2.25 is assigned for small water bodies like tanks and ponds. Tap water (running) gets 1.125 and if only buckets, pots, and tankers are in use, then the allocated value is 0.5. This rating is then averaged across all individuals in that institution to get a Mean Rating (M-R) for that feature. Thus M-R represents the actual situation existing for the elephant/s.
- Therefore, using the maxima given by experts as a base, a rating scale starting from zero to the particular maximum value for that parameter has been used and the data for each animal was collected, in a given regime (for example, forest camp or temple).
- In this investigation, variables which represent a common feature of the captive situation have been grouped to form a parameter. The variables have been termed sub-parameters. For example, the variables shelter type, shelter size, floor type in the shelter; all represent different aspects of the physical space provided to the elephant. Hence, they are grouped together to form the parameter "Shelter" and each constituent variable is a sub-parameter. In this investigation, the E-R for a parameter (say, shelter) represents the mean of E-Rs across all related sub-parameters. The Mean Rating (M-R) for a parameter is the mean of M-Rs across related sub-parameters and denotes welfare status of existing conditions on the ground for the particular parameter.
- The number of such related parameters (sub-parameters) varies for each regime.
- Results have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the parameters observed. The difference between E-R and M-R (expressed as percent) indicates deviations from the prescribed norm.
- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) have been used to indicate the professional/ socio-economic status, of value to the handler and his elephant.
- N* refers to number of sub-parameters observed. N refers to number of individuals

Result
Population Status
Forty-two elephants were observed, of which 26 were females and 16 males. Age ranged from a new-born calf to 56yrs for females, from 3 to 34yrs for males. Figure 1 gives the age and sex class distribution in the FC. The number of females increased with increasing age up to the age of 40yrs, after which they declined. The number of males declined from the age-class of 16-

40yrs itself. There were no elephants, male/ female, aged more than 60 years and 14% (N= 42) of the elephants (considering both sexes together) was constituted by calves (less than five years of age).
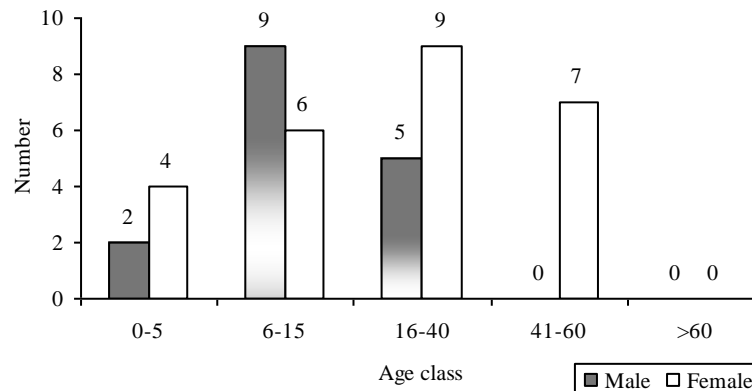

Figure 1: Age-sex distribution of elephants in FCs

Source of elephants

Acquisition of elephants is an important factor in determining the change experienced by elephants: captive born elephants are exposed to different levels of human control as compared to those brought in from the wild. The elephants experience change in living conditions and consequent stress even when they are shifted across owners/ management types.

- Sixty eight percentages of the elephants (N= 41) whose source was known were captive born; of the 19 mother-offspring pairs, four had been separated, either due to shifting of the mothers or shifting of calves; 63% (N= 41) elephants born in this FC continued to stay there; Figure 2 gives the distribution of known calf-births in the FC
- Seventy one percentages of the captive born elephants (N= 28) were sired by wild males; data was not available for the remaining
- Thirteen elephants, all females, had been purchased from the Sonepur Mela in Bihar
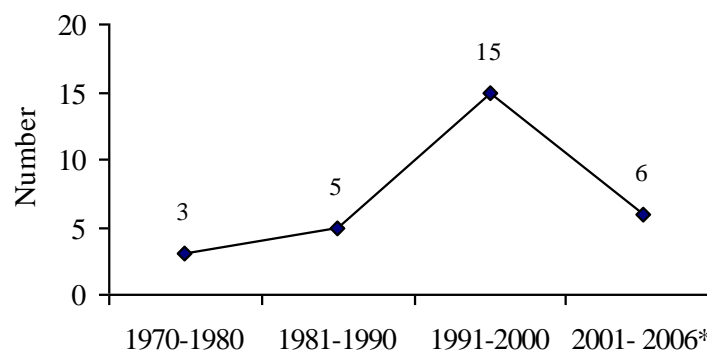
*: up to the year of survey

Figure 2: Year-wise distribution of births

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M-R for this parameter was 4.6 (SE= 0.3, N= 41) implying a deviation of 24% from E-R.

Purpose of keeping
The aim of maintaining elephants can be an indicator of the prevalent welfare status when considered along with the opportunities provided to express species-typical behaviours.

- Forty six percentages of elephants (N= 37) were used for tourism related work
- Comparable percentages (24% and 30%) were used for tourism + patrolling and patrolling + fodder collection

M-R was 3.8 (SE= 0.3, N= 40) showing a deviation of 52.3% from E-R.

Shelter
Provision of space for movement to perform species-specific activities is essential for captive elephants as wild elephants are known to have home-range sizes of 250- 1000 km^2 (Sukumar, 2006). This space should have suitable vegetation for the elephants to forage.

- All the elephants were kept in forest conditions
- The animals were chained in the open when not working
- Natural earthen flooring was available

M-R for shelter type was 0.5 (SE= 0.0, N= 30) with a deviation of 93.8% from E-R. M-R for flooring was 8.0 (SE= 0.0, N= 24) with no deviation from E-R.

Water
Ease of availability of water to the elephants when needed, absence of contamination, opportunities to perform natural behaviours (wallowing/ dust-bathing) has been considered for rating. In addition, the scrub material used by handlers has also been rated as hard materials can result in injuries.

- Tap water and rivers/streams were the combined source for 90% of the elephants (N= 41)
- Distance to river varied from 100m to 2.5km
- Elephants were bathed in the river/ stream; frequency was once-a-day; duration was 1-15hrs; bathing materials used were burnt bricks
- The elephants were allowed to drink water 3-5 times/ day
- Water quality tests were not done

M-R was 4.3 (SE= 1.1, N*= 6) showing a deviation of 45.7% from E-R (Figures 3a and 3b).
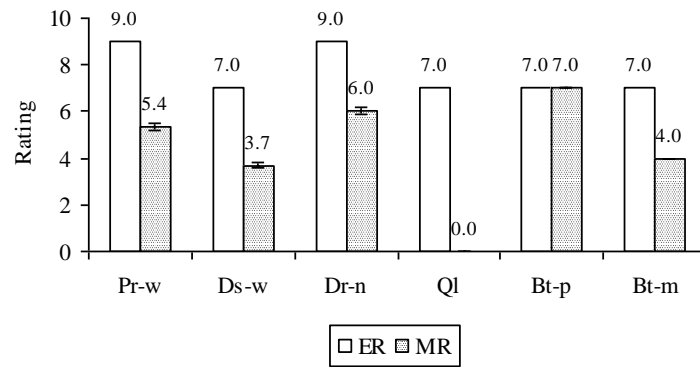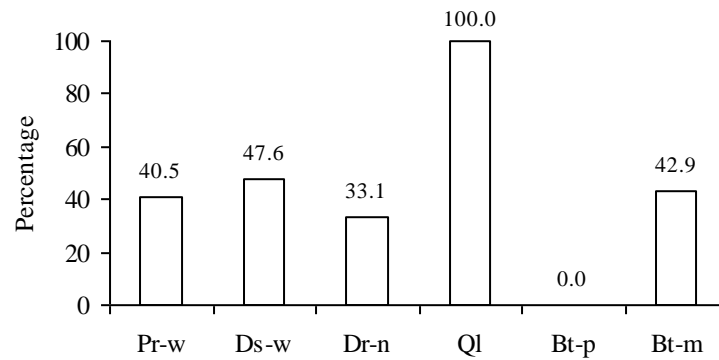
Figure 3a: Comparison of E-R and M-R for 'water' sub-parameters

Pr-w: Availability of perennial source of running water   Ds-w: Distance to water source
Dr-n: Number of times drinking water   Ql: Water quality tests
Bt-p: Bathing place   Bt-m: Bathing materials

Figure 3b: Percentage wise deviation from E-R for 'water' sub-parameters

Sleep
Unsuitable sleeping places due to restriction imposed on movement cannot be considered to be suitable for elephants.

- All elephants slept in the open in forest conditions
- The elephants were tied by a chain of length 8-12ft.
- Duration ranged from 2- 10hrs

M-R was 3.2 (SE= 2.9, N*= 3) with a deviation of 60% from E-R (Figures 4a and 4b).
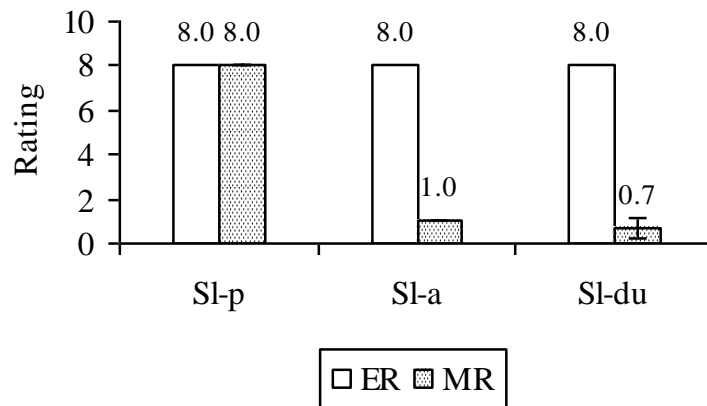
Figure 4a: Comparison of E-R and M-R for sleep sub-parameters
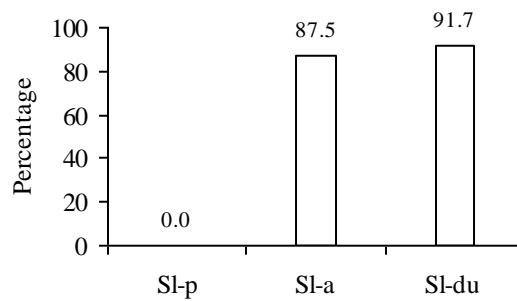
Sl-p: Sleeping place   Sl-a: Sleep area (size)   Sl-du: Sleep duration

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

Walk

Provision for elephants to walk on suitable surfaces in forest conditions can be a form of exercise as well as psychological stimulation.

- All elephants were walked in the forest, accompanied by their handlers
- Distance covered ranged from 3- 15km
- Duration of walk ranged from 1-6hrs

M-R for nature of terrain was 8.0 (SE= 0.0, N= 36) with no deviation from E-R. M-R for duration of walk was 0.0 (SE= 0.0, N=36) showing 100% deviation from E-R.

Social interaction

Most captive elephant systems impose restriction on their animals' vis-à-vis opportunity to interact with other elephants.

- Forty one percentages of elephants were allowed to interact with other elephants in the camp; this percentage of elephants included 76% elephants which were less than 10y
- Duration of interaction ranged from 6- 24hrs/day

- Number of individuals, available for interaction, ranged from 1-3

M-R was 4.5 (SE= 0.5, N* = 4) implying a deviation of 43.8% from E-R (Figures 5a and 5b).
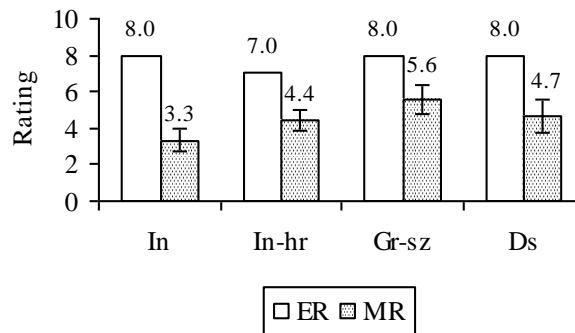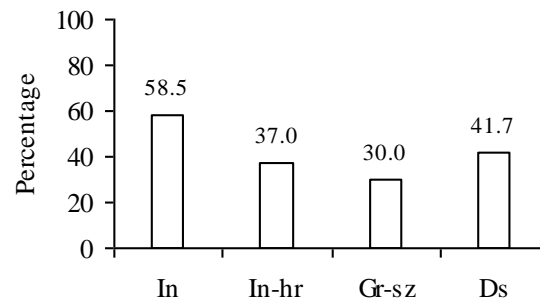

Figure 5a: Comparison of E-R and M-R for interaction sub-parameters

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

Figure 5b: Percentage wise deviation from E-R for interaction sub-parameters

Chaining
A practice in captive elephant systems with far-reaching consequences on all aspects of an elephant's life is that of chaining the animal. Restriction on movement prevents expression of species-typical activities even when other suitable features are available for the elephant/s.

- Ninety percentage of elephants (N= 41) were chained when not working
- The elephants which were not chained were less than four years
- All elephants were tied in the leg region
- Fifty four percentages of elephants (N= 37) were hobbled
- Six female elephants (aged between 25-50y) and five male elephants (aged between 11-34y) were fitted with spiked chains
- Chain weight ranged from 9-82 kg (Figure 6 gives the relationship between chain weight and age of the animal); chain length varied from 8-12ft.
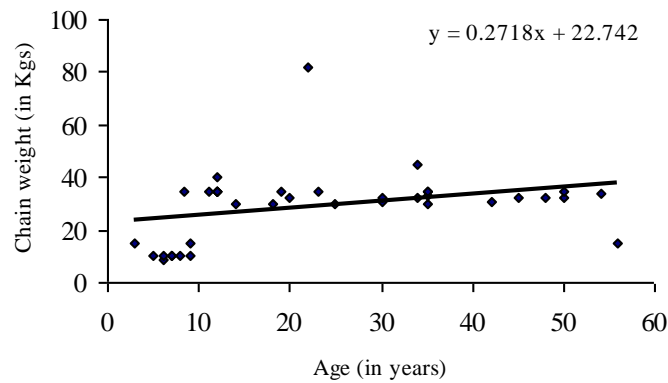- None of the elephants was allowed to free range at night

Figure 6: Relationship between chain weight and age of elephant

M-R was 1.7 (SE= 0.8, N*= 6) with a deviation of 78.7% from E-R (Figures 7a and b).
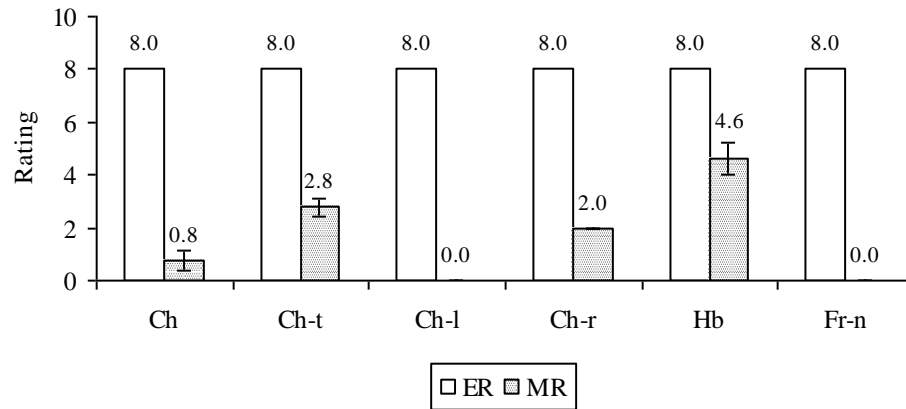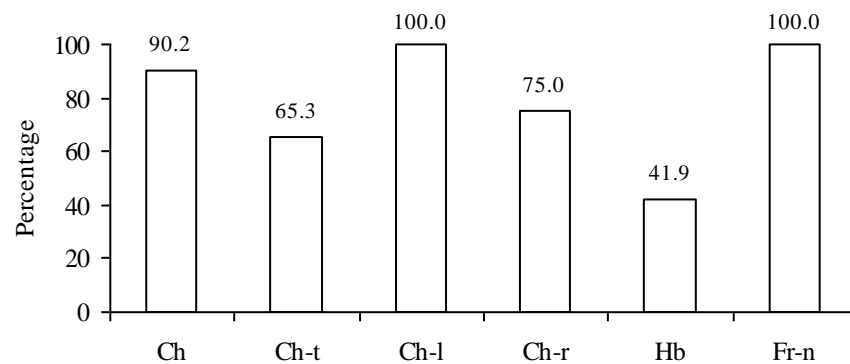

Figure 7a: Comparison of E-R and M-R for 'chain' sub-parameters

Ch: Chained/ free-ranging   Ch-t: Chain type
Ch-r: Chaining region (on the body) Hb: Use of hobbles Fr-n: Opportunity to free range at night

Figure 7b: Percentage wise deviation from E-R for chain sub-parameters

Observed behaviour

Elephants which are tractable may not undergo the severity of restrictions imposed as experienced by those which are perceived to be aggressive/ difficult to control. In captivity, stereotypy is considered to be an important indicator of welfare and has thus, been rated.

- Seventy one percentages of elephants (N= 41) were described as quiet/ reliable; 22% (N= 37) were reported to be aggressive towards people/ other elephants, of these only one was a female and the rest were males
- Two adult elephants, a 34y old male and a 50y old female, had both killed their handlers
- Of the ten elephants showing stereotypy, six were females and four were males

M-R was 6.2 (SE= 0.1, N*= 3) with a deviation of 23% from E-R (Figures 8a and 8b).
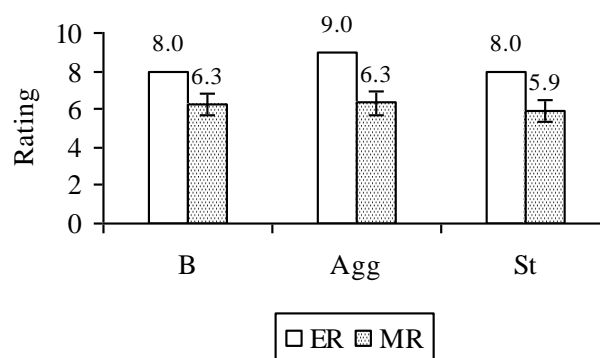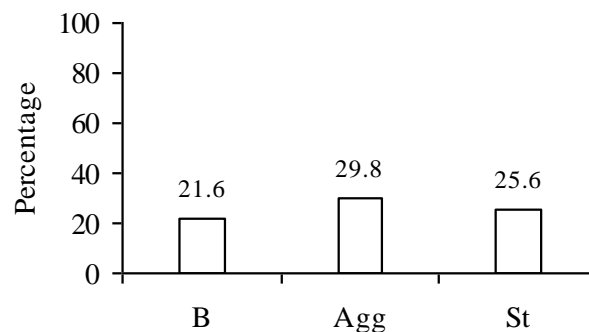

Figure 8a: Comparison of E-R and M-R for 'behaviour' sub-parameters

B: Observed behaviour   Agg: Occurrence of aggressive behavior   St: Occurrence of stereotypy

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

Work

Work conditions determine not just the nature of behaviours performed; it also affects the opportunities available to the animals to perform species-typical behaviours when not being used for work.

- Sixty seven percentages of elephants (N= 42) were used for work, elephants were aged between 8 to 56yrs
- Work type was patrolling, providing rides for tourists or fodder collection
- Timings varied from 6a.m. to 9a.m., 3p.m. to 5 or 7p.m., 5p.m. to 8p.m.; duration ranged from 3-7hrs
- Age when elephants began to work ranged from 7 to 12yrs
- Number of people carried for rides ranged from 3-8; maximum distance covered with weight was 5-10km; howdah weight was less than 50kgs; howdah consisted of soft *gunny* bags
- Water and food was available for all elephants; rest was not provided for 42% (N= 12) of observed elephants

M-R was 4.2 (SE= 1.3, N* = 7) implying a deviation of 47.6% from E-R (Figures 9a and 9b).
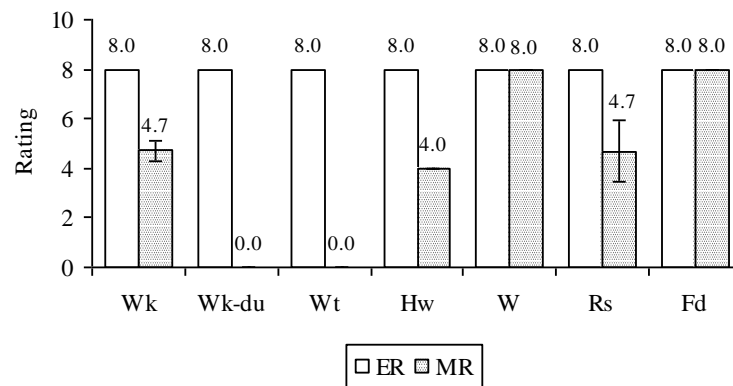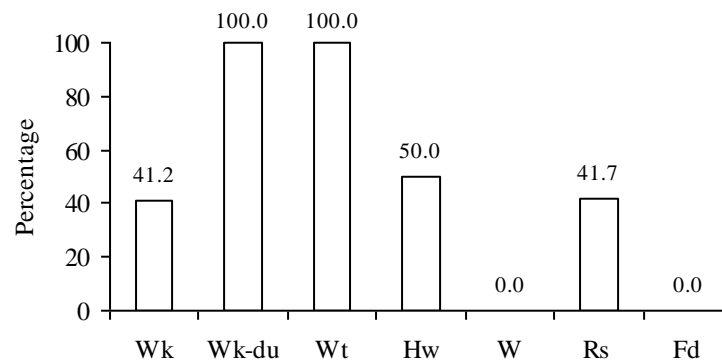
Figure 9a: Comparison of E-R and M-R for 'work' sub-parameters

Wk: Work type   Wk-du: Work duration   Wt: Weight carried   Hw: Howdah type
W: Water availability   Rs: Rest availability   Fd: Food availability

Figure 9b: Percentage wise deviation from E-R for 'work' sub-parameters

Food
A wide variety of plant species and plant parts are eaten by wild elephants (Sukumar, 1991); foraging forming a major activity of the elephants. In captivity this maybe restricted in terms of variety and opportunity to forage in the forest.

- All elephants were allowed to forage as well as provided stall feed; foraging was limited to the period when they were worked (patrolling)/ or while being taken for fodder collection
- Stall feeding duration ranged from 3-8hrs; included fodder was *Hogla* (*Typha angustifolia*), *Prundi* (*Alpinia nigra*), *Nol* (*Arundo donax*), *Banaspati*, *Bhutta grass* (*Tripsacum laxum*), *malsa*, *Madhua* (*Saccharum arundinaceum*), *Khagra*, *Dhadda*, (*Saccharum narenga*) *Chepti* and cooked food such as rice, pulses, *jeera* (cumin seeds), *methi* (fenugreek seeds) and salt
- Mineral mix was not given for any of the elephants
- Ration charts were maintained for 81% (N= 36) of the elephants

M-R was 3.8 (SE= 2.0, N*= 5) with a deviation of 53% from E-R (Figures 10a and 10b).
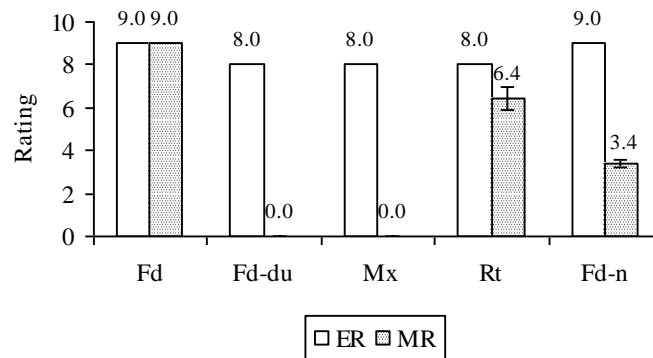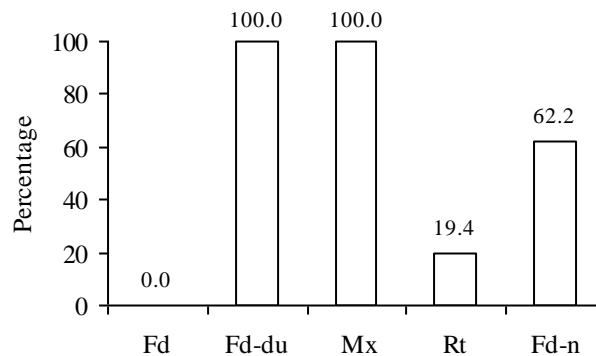

Figure 10a: Comparison of E-R and M-R for 'food' sub-parameters

Fd: Food provisioning type   Fd-du: Feeding duration Mx: Availability of mineral mix
Rt: Use of ration chart   Fd-n: Number of stall-fed items

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

Reproductive status
In captivity, normal reproductive functioning maybe absent either due to absence of individuals of opposite sex or due to restrictions imposed on movement by chaining the animals or due to health/stress induced factors.

Female reproductive status
- Only two adult elephants were not exposed to males
- 18% of the observed females (N= 18) were not given opportunity to breed
- Mating had been observed for all the elephants provided with breeding opportunity
- Wild males were the male source for all the matings
- Number of calves born ranged from 0 to 8 per female; two premature births were reported for a 25y old female, both calves did not survive

M-R was 5.2 (SE= 0.7, N*= 5) indicating a deviation of 25.2% from E-R (Figures 11a and 11b).
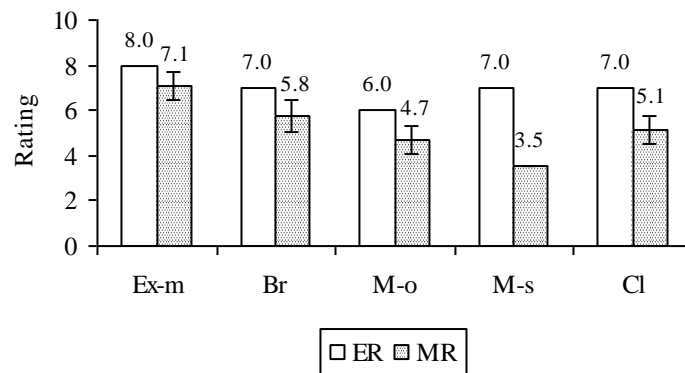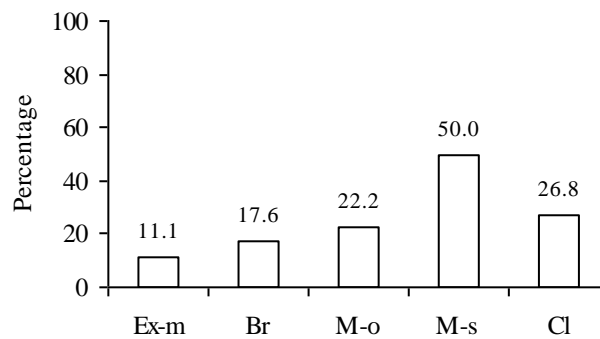

Figure 11a: Comparison of E-R and M-R for female reproductive status

Ex-m: Exposure to males   Br: Opportunity to breed   M-o: Mating observation
M-s: Male source   Cl: Number of calves born

Figure 11b: Percentage wise deviation from E-R for female reproductive status

Male reproductive status
- None of the observed adult males was exposed to females (N= 10)
- None had sired any offspring
- Only one male of the eight (for which data was available) exhibited musth; had killed a person during musth

M-R was 0.3 (SE= 0.4, N*= 3) with a deviation of 95.8% from E-R (see Figures 12a and 12b for rating and percentage deviation from E-R respectively).
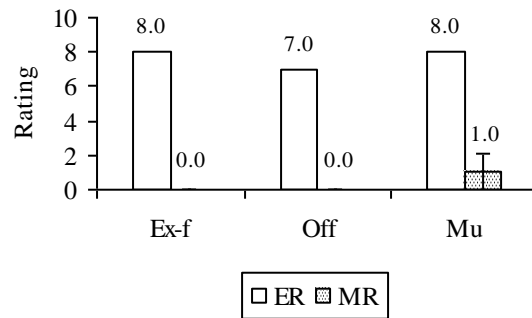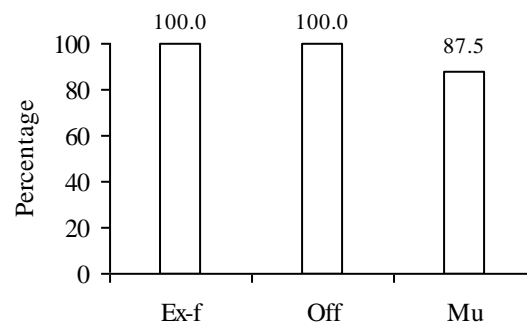

Figure 12a: Comparison of E-R and M-R for male reproductive status

Ex-f: Exposure to females   Off: Offspring sired   Mu: Occurrence of musth

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

Health and veterinary schedule

A number of diseases and disorders have been observed and treated in captive elephants (Chowta, 2010). Proper veterinary practices need to be followed for health to be maintained.

- Foot problems such as toe nail cracks, foot rot, lameness, or arthritis was observed with foot problems (Figures 19a, b, c and d) noticed in 29% of the observed elephants (N= 41); gastro-intestinal problems were observed for a 50y old female elephant
- Deworming (annually) and immunization against hemorrhagic septicemia and anthrax was done for all observed elephants, except for a 3yrs old male
- Oil was not applied onto the elephant's body for 28% elephants (N= 39); frequency was weekly to 3-5 times a week
- Sample tests of dung/ urine/ blood was not done for any of the elephants
- Body measurements were taken annually for all elephants except a new-born calf and a 35yrs old female

M-R was 5.8 (SE= 1.0, N*= 8) with a deviation of 28% from E-R (Figures 13a and 13b).
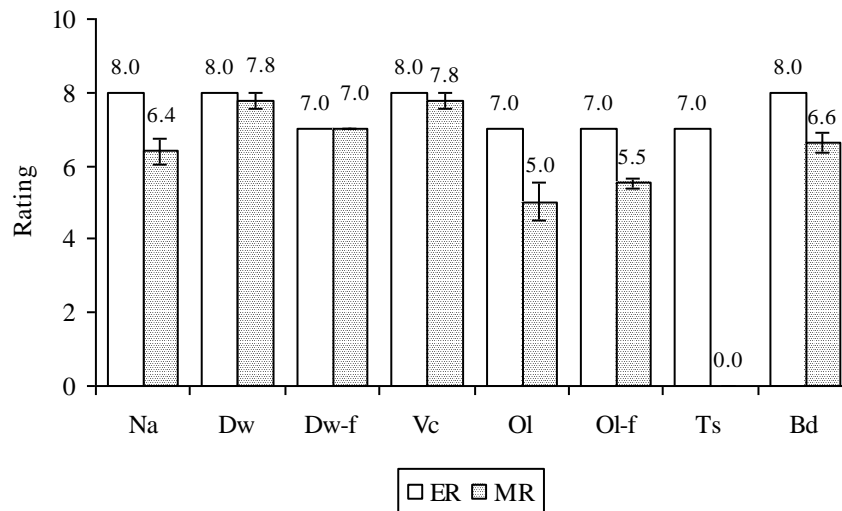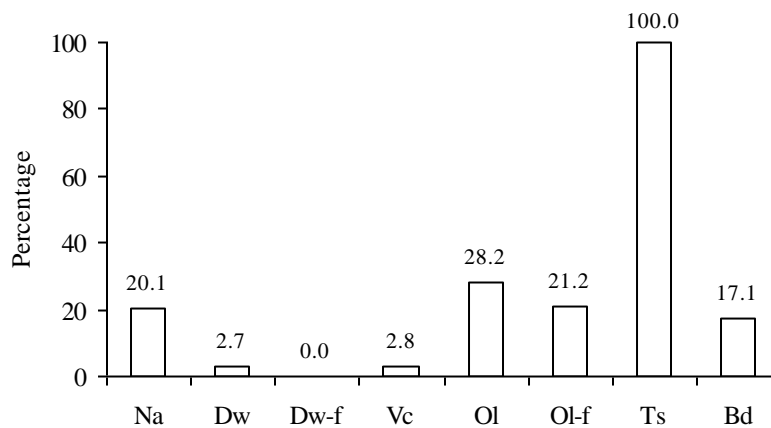
Figure 13a: Comparison of E-R and M-R for 'health and veterinary schedule' sub-parameters

Na: Nature of disease/ injury   Dw: Deworming done   Dw-f: Frequency of deworming
Vc: Vaccination done   Vc-f: Frequency of vaccination Ol: Oiling done   Ol-f: Frequncy of oiling
Ts: Dung/urine/blood sample tests Bd-f: Body measurement frequency

Figure 13b: Percentage wise deviation from E-R for 'health and veterinary schedule' sub-parameters

Veterinary personnel and facilities
Availability of veterinary personnel with relevant experience is essential in maintaining normal health of captive elephants. Insufficient or poor infrastructure can undermine efficient functioning.

- All elephants had access to a veterinary doctor who had 2yrs experience in treating elephants
- Frequency of visits was weekly
- Veterinary assistant was not available

- Records were maintained for all; frequency was annual except 7% (N= 42) of the elephants for which records were not updated
- Mobile veterinary clinic with minimum facilities was available; staff quarters, cooking shed, provisions shed were provided

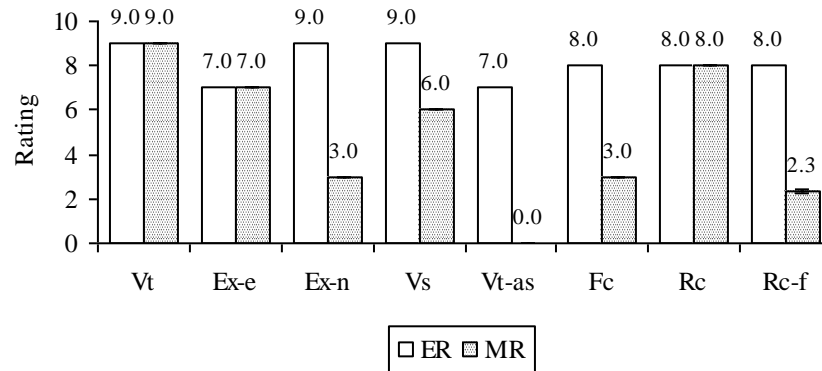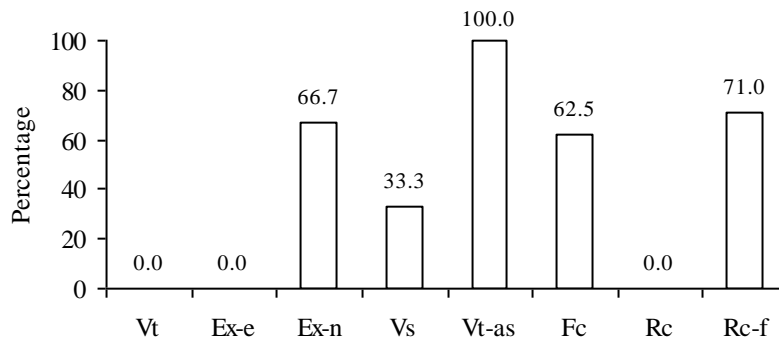M-R was 4.8 (SE= 1.2, N*= 8) with a deviation of 40% from E-R (Figures 14a and 14b).

Figure 14a: Comparison of E-R and M-R for veterinary personnel and infrastructure

Vt: Availability of veterinary doctor   Ex-e: Experience with elephants
Ex-n: Number of years of experience Vs: Frequency of visits   Vt-a: Availability of veterinary assistant
Fc: Facilities available   Rc: Record keeping Rc-f: Frequency of record keeping

Figure 14b: Percentage wise deviation from E-R for veterinary personnel and infrastructure

Handlers' experience and socio-economic status
Thirty-nine handlers (mahouts/cawadis) were in charge of 42 elephants, of which, six handlers managed two elephants each. Mean age of handlers was 34yrs (SE= 1.6, N= 39) ranging from 19-57yrs.

Professional experience
- Experience in this profession (Mean= 12yrs, SE= 1.4, N= 36) and with a specific camp elephant (Mean = 9yrs, SE= 1.2, N= 32) ranged from six months to 30yrs (Figure 15 show the Relationship between professional experience and experience with specific elephant in camp)

- Forty two percentages of the handlers (N= 33) opted for this profession as a means of employment
- Eighty four percentage of handlers (N=37) used tools‒ metal ankush/ stick pike/ wooden ankush to control their elephants
- Number of elephants each handler had worked with ranged from 1-5
- The number of hours spent with respective elephant ranged from 8-16hrs
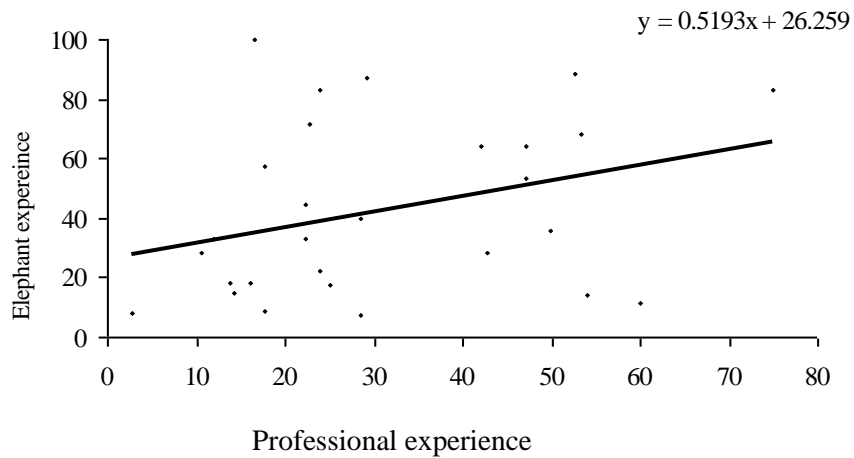
$$y = 0.5193x + 26.259$$

Figure 15: Relationship between professional experience and experience with specific elephant in camp

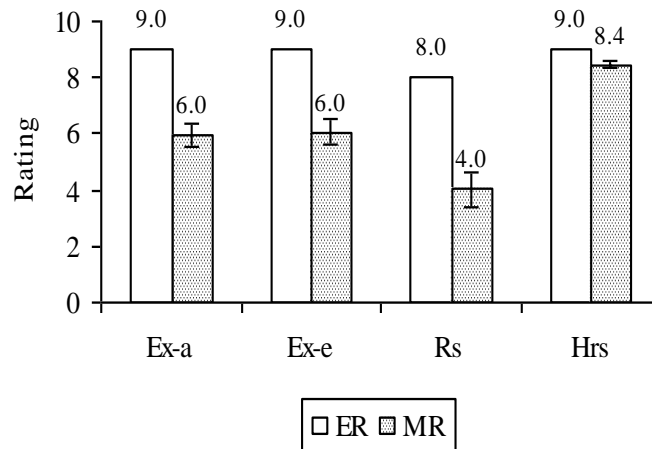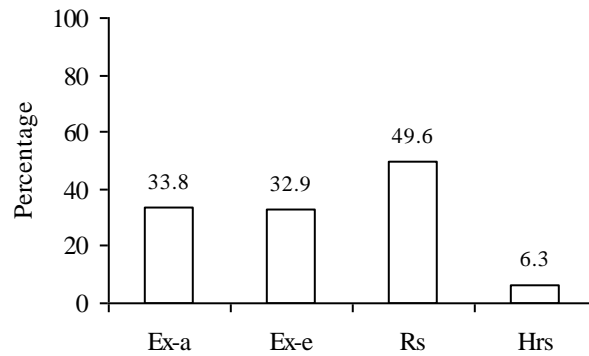M-R was 6.1 (SE= 1.0, N*= 4) showing a deviation of 32.1% from E-R (Figures 16a and 16b).

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

Ex-a: Experience as percent of handler age   Ex-e: Experience as percent of elephant age
Rs: Reason for choosing this profession   Hrs: Hours spent with elephant

Figure 16b: Percentage wise deviation from E-R for handlers' professional experience

Socio-economic status
- Seventy two percentages of handlers (N= 36) did not have relatives working in this profession
- Family occupation for 84% of handlers (N= 37) did not involve elephant care/ maintenance
- Sixty seven percentages of handlers (N= 18) were educated, none had studied up to the 10th class
- Mean annual salary drawn was Rs.34, 000; ranging from Rs.16,800 to Rs.84,000/- Figure 17 gives the association between professional experience and annual salary.

$$y = 1.1823x + 22.538$$
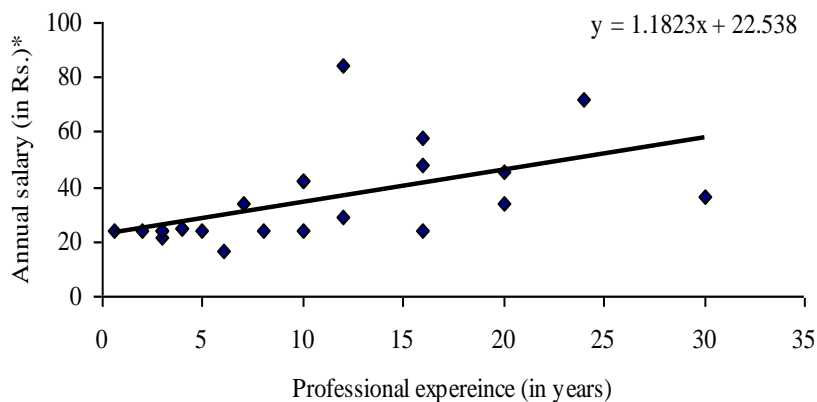
*: Salary in thousands

Figure 17: Relationship between professional experience and annual salary

- Number of children per family ranged from 1-5
- Number of languages known to read/write/speak ranged from 1-3
- Fifty six percentages of handlers (N= 34) were not covered by insurance; insurance coverage was provided by an NGO

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- Sixty one percentage of the handlers(N= 38) consumed alcohol; most was consumed after work

M-R was 3.4 (SE= 0.7, N*= 9) indicating a deviation of 51.1% from E-R (Figures 18a and 18b).
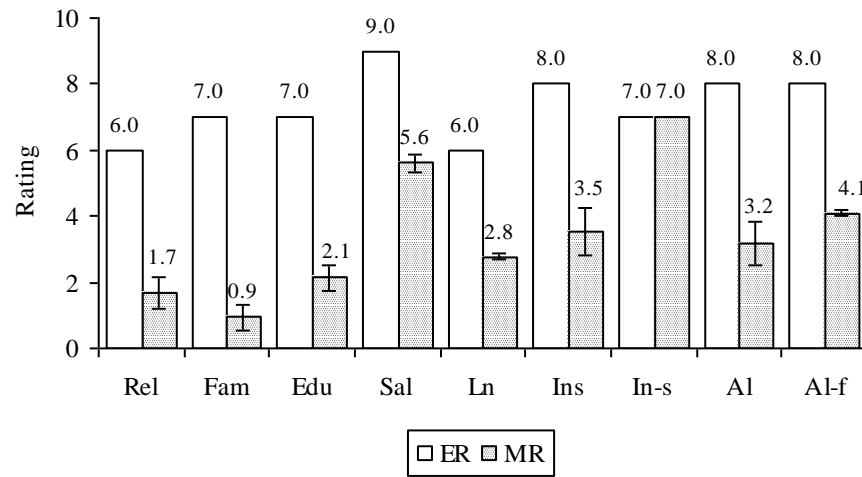

Figure 18a: Percentage wise deviation from E-R for handlers' socio-economic status
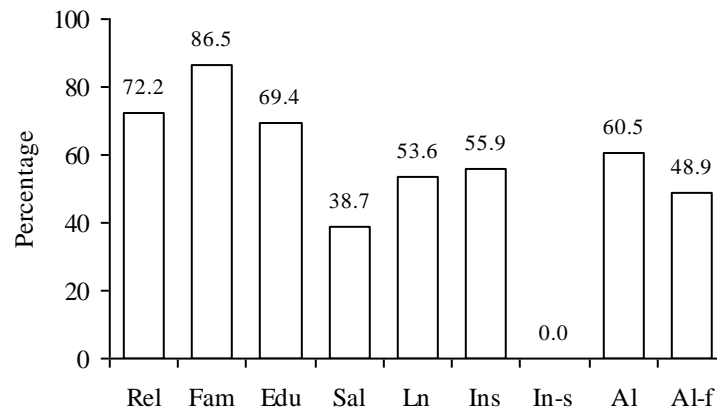
Rel: Relatives as handlers   Fam: Family occupation Edu: Education level
Sal: Salary drawn   Lan: Languages known In: Insurance availability
In-s: Source of insurance   Al: Alcohol consumption   Al-f: Timings of consumption

Figure 18b: Percentage wise deviation from E-R for handlers' socio-economic status

Overall welfare status
Overall M-R, considering all observed sub-parameters together, was 4.3 (SE= 0.5, N*= 64) implying a deviation of 42% from E-R. Figure 19 gives the distribution of Percentagewise deviation across all observed sub-parameters. 42% of all parameters (N*= 64), across physical, social and reproductive features, showed a deviation of 50% or more from E-R.

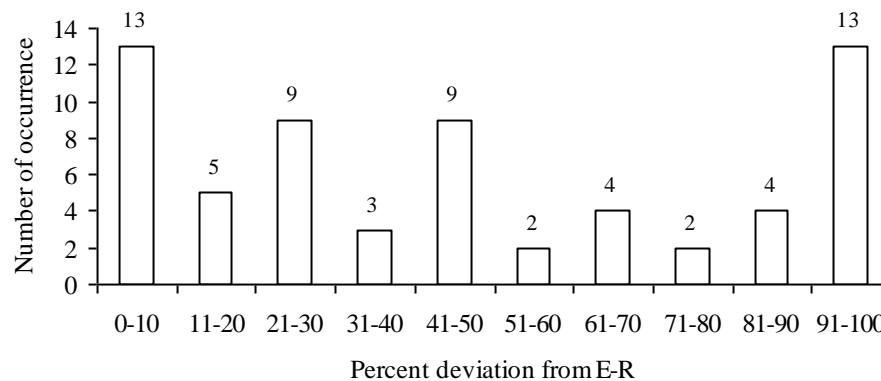Figure 19: Distribution of Percentagewise deviation from E-R across all observed sub-parameters

Discussion

Maintaining elephants in captivity enforces a set of conditions for the animals, conditions which are determined by people. These conditions may or may not be suitable for the elephants. Thus, welfare of such elephants will be compromised when their living conditions are not suitable.

The deviations in living conditions experienced in captivity, from those in the wild, in terms of ability to engage in species-typical behaviours will result in poor welfare for the elephants. This aspect was rated for the elephants in this camp.

Features which were not conducive to elephants' welfare in the camp were:
- The practice of chaining elephants was one major aspect impinging on all other captive conditions of the elephants. The elephants were in a physical environment that was suitable for them (wild elephants occurred in this area), but this was not available to the captive elephants due to chaining of the animals when not working. Their effective shelter size and ability to move freely was thus restricted to the area prescribed by the chain length. None of the elephants was allowed to free-range at night;
- The availability of rivers/ streams was utilized for bathing the elephants, but water sources could not be used by the animals on their own accord as they were provided tap water while in the camp
- Information on social interaction was restricted to younger elephants only: of the 17 elephants with opportunity to interact, 76% were elephants less than 10y old. Less than 10y old elephants formed only 33% of the group in this camp.
- Stereotypic behaviour was observed in equal proportions among male and female elephants
- While use for work in near-natural conditions was commendable, females with calves less than a year old were also worked for patrolling / providing tourist rides. This would imply the calves would be essentially made to walk during the work period without recourse to suckle from their mothers/ take rest when needed.
- Given the availability of natural fodder in the forest area, none of the elephants was reported to be allowed foraging opportunity in the form of free-ranging to browse/graze, the elephants grazed/browsed while being walked during work or for fodder collection;

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this would have ensured performance of species-typical activities at least during the duration of free-ranging and helped provide greater variety of feed for the elephants

- Reproductive success among the female elephants was nearly 100%, only three adult females (> 15y) had not contributed to calf-birth. This was also borne by the source of captive elephants in the camp with 68% (N= 41) elephants being born in captivity. However, only wild males were the male source for all the females. This, despite presence of males in musth in the camp. This was because of the practice of chaining all the elephants when not being used for work. Thus, even if reproductively active males were present they could not access the female. A newspaper report (The Telegraph, December 9, 2009) mentions the attacks from wild males on the male elephants in this camp, a male having reportedly died following injuries inflicted by the attacks. The practice of chaining the elephants would not only expose males to attacks from wild males, but also reduce the genetic variability available in the form of the captive males.
- The camp was home to 15 pairs of mother-offspring elephants, which is a commendable feature. There were, however, mother-offspring pairs that were broken due to shifting of either the mother or the offspring to a different location.
- Absence of the practice of sampling dung/ urine/ blood for various physical or biochemical tests

Handler status
- Mahouts/ cawadis came from a background which did not deal with elephants, implying new entrants into this profession
- Insurance cover was not available to all handlers, it was restricted to 44% of the handlers
- Alcohol consumption was observed among more than half of the mahouts/ cawadis

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Andaman Nicobar Forest Department (The Department of Environment & Forests) is the nodal department in the administrative structure of Andaman & Nicobar Administration for planning, formulation and implementation of policies and programmes for conservation, protection, and management of the forests and wildlife in the territory. The main objective includes, conservation of environment, forests and wildlife following National Forest Policy, 1988 and through protection, effective planning and scientific management, meeting local requirement of forest produce through sustainable utilization of forest resources, implementing provisions of the Indian Forest Act, 1927, the Wildlife (Protection) Act, 1972, the Forest Conservation Act, 1980 and the Environment Protection Act, 1986 including the Coastal Regulation Zone Notification, 1991, promoting research in forestry and wildlife, human resource development through capacity building and awareness generation by educating people and promoting eco-tourism and peoples participation.

Karnataka Forest Department was born on 11.1.1864 with a complement of five officers. The main aim of the department is to protect, conserve and promote sustainable development of the forests of the State and to promote tree based farming in support of soil and water conservation on agricultural lands. The department protects the forests and wildlife from various types of pressures and threats. The main protection activities include fire protection, boundary consolidation, prevention and removal of encroachment from the forest area, prevention of illicit cutting of timber and firewood, indiscriminate harvest of non timber forest produce, prevention of poaching of wild animals etc. The Department undertakes regeneration, soil and moisture conservation works, canopy manipulation, weeding, climber cutting habitat improvement, wildlife management etc., the department aims at increasing the productivity of the forests to meet the growing demands of the people. The afforestation is done on degraded forest lands, community lands, C & D class lands, fore-shore areas and other institutional lands.

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

Compassion Unlimited Plus Action (CUPA) is a non-profit public charitable trust registered in 1991 that works for the welfare of all animals. Since 1994, CUPA has worked in close collaboration with government departments and agencies on various projects. CUPA's mission is to protect animals from abuse and violence and do what may be required to alleviate their suffering at the hands of humans. CUPA does not differentiate among pet, stray or wild animals, since all of them require assistance and relief from cruelty, neglect and harm. The organisation's objective has been to design services and facilities which are employed fully in the realisation of these goals.

Asian Nature Conservation Foundation (ANCF) is a non-profit public charitable trust set up to meet the need for an informed decision-making framework to stem the rapidly declining natural landscape and biological diversity of India and other countries of tropical Asia. The Foundation undertakes activities independently and in coordination with governmental agencies, research institutions, conservation NGOs and individuals from India and abroad, in all matters relating to 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 flora.

College of Veterinary Science, of Assam Agricultural University (CVS-AAU), under the Faculty of Veterinary Science, has celebrated its Golden Jubilee Year in 1998 and during its 50 years of existence the college has contributed immensely in the human resource development for not only the state of Assam but also for the entire North Eastern Region and the country as a whole. The faculty is contributing immensely towards the cause of conservation in the region by mostly taking care of the captive and free range elephant wealth of the region, rhino translocation etc. and also playing a pivotal role in the country in training of manpower in handling wildlife healthcare and managerial issues.

World Society for Protection of Animals (WSPA) With consultative status at the United Nations and the Council of Europe, WSPA is the world's largest alliance of animal welfare societies, forming a network with 910 member organisations in 153 countries. WSPA brings together people and organisations throughout the world to challenge global animal welfare issues. It has 13 offices and thousands of supporters worldwide.

The welfare status of captive elephants in forest camps of India was assessed by comparing the captive environment with that of the wild. .The conditions for elephants in captivity are quite different from those available in the wild. This deviation has been used in comparison with their current status to suggest any remedial measures to improve their well-being. Three hundred sixty-three elephants belonging to Andaman, Assam, Karnataka, Kerala, Tamil Nadu and West Bengal were observed for this investigation.