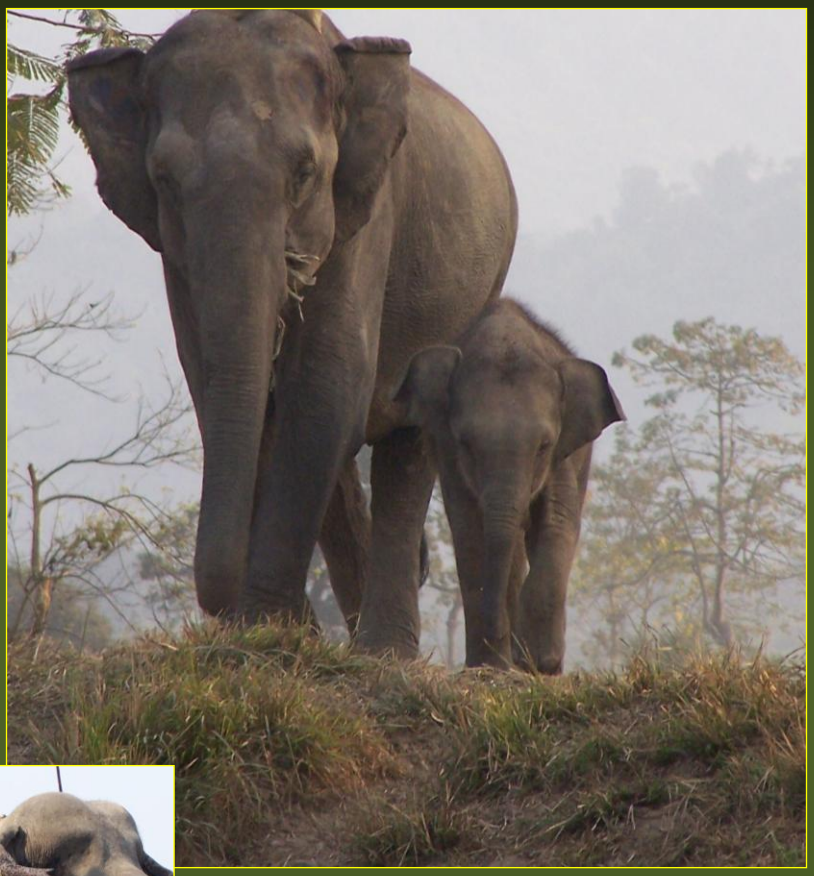
Captive Elephants in Assam



An Investigation into the Population Status, Management and Welfare Significance

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Elephants in Captivity: CUPA/ANCF- Technical Report.18

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Surendra Varma[1], Kushal Konwar Sarma[2] and S. R. Sujata[3]

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CONTENTS

Preface

India's North East, particularly the state of Assam, is viewed as one of the last strongholds of the Asian elephant, where, over 5000 are found in tropical forests and grasslands, and less than 1500 continue to thrive in captivity. The legacy of a rich tradition of keeping elephants in captivity by the inhabitants of this region goes back to several centuries. The epic Mahabharata claims that King Bhagadatta of Kamrup, the name by which ancient Assam was known, joined the Kauravas in the battle of Kurukshetra with an army of over 10,000 battle elephants. The Ahoms, a Thai race which entered Assam in the 13th century AD and went on to establish a mighty kingdom over successive centuries too contributed substantially towards the culture of keeping elephants in captivity. The importance the Ahoms attached to the administration and maintenance of elephants could be gauged from the high rank the position of *hatibaruahs (*special officers dealing with elephants) enjoyed in the Ahom royal hierarchy.

During the British period the privilege of keeping elephants was taken over by the new local feudal elite and the colonial regime. The colonial administration through forest departments, administrated and managed the forest resources, captured elephants from the wild regularly to be used in timber industries and plantations. The exploitation of the forest using all means including elephants continued till the Supreme Court of India imposed a blanket ban on any kind of commercial logging in the North East in 1996 and the same brought the entire timber industry to a complete halt. This rendered the elephants jobless almost overnight and without any viable income to take care of the animals which are very expensive to maintain, most of the private owners started disposing them off. It is assumed that between 1997 and 2002, not less than 800 elephants were sold to Bihar and Kerala, Tamil Nadu or tourism fields in Rajasthan and Nepal. Some owners in Assam were compelled to let loose their domestic elephants in the wild to become feral elephants.

Even with the problems of males running amuck during musth, during the logging days the males were favored owing to their greater strength and capability of working continuously. Interestingly, female elephants were continuously on long maternity leave before and after calving, a consequence of being always surrounded by a forested environment and mated by both wild and domestic bulls regularly. This led to a preference of males for work, over females, and resulted in more males being jobless. Without any revenue generation, males became more difficult to keep and maintain, they were primarily sold to Kerala State, through Bihar's Sonepur Mela. There is a report that Kerala's captive elephant population grew from 350 in 1996 to 800 in 2009. Nepal's captive elephant population grew from 70 to 300.

Captive elephants in the North East (current or past) continue to enjoy the near wild/natural conditions as a result of their location in the vicinity of forests either because of being employed in the timber industry or because of being owned or managed by tribal communities residing in close proximity to the forests. The prolific rate of reproduction of the captive female elephants and low mortality of these calves is a testimony to a mature and benign elephant keeping culture practiced by the tribesmen here in India's North East. Currently the State estimates a population of 1200 elephants in captivity. These elephants can

be categorized into 3 broad categories, viz., forest camps (FC), zoo, and private ownership. 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 often with both camp and wild elephants. Their main work is the carrying of visitors and tourists in the many National Parks (NP) of the state, participating in *koonkie* operations and patrolling the protected areas as part of anti poaching operations. Their lives in forest camps are occasionally marked by stress or due to overwork caused by tourism and/or while mitigating HEC where they have to play an active role, often for days on end.

Elephants in zoos have ironically limited lives, due to the zoo environment being limited in scope to provide natural and free ranging lives to their captive elephants. Elephants in private ownerships are the victims of poor owners, agents, brokers and often can be misused or abused for commercial reasons. Owners hire them or lease them to distant places for logging, dragging heavy loads, filming commercial movies and other varied activities. When needed they are sold to other states, for religious, entertainment or commercial activity through a network of highly organised and complex system, designed by the traders of this lucrative trade.

However, even in poverty, captive elephants kept in Assam lead a better quality of life compared to those maintained in other states in India or in other non-range countries. In captivity in non-range countries, even with intense management and resource expenditure, natural living conditions have not been able to be created. The social life of Assam's captive elephants replicate near-natural conditions as compared to those maintained in isolation in states such as Kerala/Tamil Nadu or Bihar. Similarly, access to natural water sources (river/stream) in Assam cannot be found in a state like Rajasthan or Punjab.

This report is an effort to focus on the current conditions of captive elephants in Assam and for the first time to highlight their captive conditions, possible improvements and recommendations for their welfare and protection onto the national radar. The sequence of presentation of each regime is based on a decreasing order of existing welfare standards revealed by the investigation. This document has four sections, section one, deals with overall population status, management and welfare of captive elephants in Assam. The first section along with the executive summary also provides recommendations for the state. Section two describes welfare status of elephants and handlers in FCs, section three expresses welfare status of elephants and handlers in the Guwahati Zoo and section four explains the welfare status of elephants and handlers under private ownership.

Acknowledgements

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Section 1:
Captive Elephants in Assam

Executive Summary

The North-eastern region of India accounts for 55% of the captive population of elephants in India. This investigation aims to assess the welfare status of elephants, the professional experience and socio-economic status of handlers in Assam under different management regimes.

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.

A 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.

Three regimes: Forest Camps (FCs), Individuals owning elephants (Private ownership, Pvt.) and a Zoological garden (Zoo) were surveyed. A total of 118 elephants were observed, with 71 females and 47 males comprising the survey. The age-class distribution suggests that, while 18% formed those more than 40 years, 49% of all the elephants were constituted by the age group between 16-40 years.

Fifty four percent of all elephants, irrespective of regimes, were wild caught/ rescued from the wild. Among FC elephants, most (59 %,) were captive born; 39% were wild caught/ rescued from the wild. Most privately owned elephants were caught in the wild (86%), 7% were captive born. All zoo elephants were rescued from the wild.

Most FC elephants, except two, had access to forests; the elephants were subject to a combination of being tied within the camp site or left to free range in the forest. Privately owned elephants were tethered to trees when not working, exposed to natural (earthen) flooring without any man-made roofing. Zoo elephants were kept in enclosures, they also had access to a forest area of limited size. Mean Rating (M-R) for FCs and zoo were comparable, considering the variation observed within each, with both showing relatively low deviation from Expert Rating (E-R). Minimum M-R was observed for privately owned elephants.

Several sources of water were available for FC elephants: river, stream, lake, pond and taps; 42% FCs used only rivers/ streams, remaining used a combination of different sources. For privately owned elephants, different water sources were available: ponds/ taps/ river/ stream; all elephants had access to rivers/streams with 38% using this as their sole water-source. Tap and pond water was the source for zoo elephants; bath frequency was 2 times/day in summer and once per day during winter; natural materials and stone were used as scrub. M-R was

comparable across all regimes. The variation observed for each regime implied non-uniformity in the standards for the parameters observed. In terms of deviation from E-R, zoo showed relatively greater value.

FC elephants were tethered in the open (*Pilkhana*)/in the camp site/left to free range in the forest; sleep duration varied from 1-6hrs. Eighty five percent of privately owned elephants were chained in their camp site. Zoo elephants were chained in their enclosures at night. Privately owned elephants showed relatively low deviation from E-R.

All FC elephants were walked in the adjoining forests, all privately owned elephants were given opportunity to walk, distance ranged from 1- 40 km. Zoo elephants were walked within the zoo premises, distance of 3km. Variation in the M-Rs of private and zoo elephants implied overlap of values and non-uniformity in standards.

Ninety six FC elephants were allowed to interact with other elephants, mean duration was 6 hours. All privately owned elephants were provided opportunity to interact; mean number of elephants per group was three, duration of interaction ranged from 1-24 hours. All zoo elephants were allowed to interact, but duration was restricted to 2- 2.5h.

All FC elephants were tethered to a place for varying durations; 97% of FC elephants (N= 78) were allowed to free range at night using drag-chain and hobbles. Privately owned elephants were all tethered to a place for varying durations; 80% were allowed to free range at night with drag-chain/hobbles. Zoo elephants were tethered in their enclosure; hobbles were used for elephants left to free range.

Most FC elephants (90%) were described as reliable/ quiet; stereotypy was observed in two elephants. Smaller percent of privately owned elephants (67%) were described as reliable/quiet; incidents of running amok was reported for 33% of the elephants; stereotypy was not observed for any. Zoo elephants were described as quiet/reliable; none exhibited aggression towards people. Deviation from E-R for FC and zoo elephants was relatively low. Higher deviation from E-R for privately owned elephants was observed.

Seventy six FC elephants were used for work such as patrolling, safari rides for tourists; tourists were carried on howdah weighing a mean of 56kgs; the elephants were worked for a mean duration of 3.4h. All privately owned elephants were used for work such as logging, *Koonkie*, patrolling, participating in festivals; timings ranged from early morning to noon and/ or in the afternoon; *Koonkies* were worked at night. Zoo elephants more than 12y of age were used for work such as carrying tourists or fodder; work duration was 1-1.5h in the afternoon. Ratings across regimes were comparable indicating similarity in conditions irrespective of regimes.

All FC elephants, except for two rescued calves, were provided stall feed as well as free-ranging opportunity; Banyan stem (*Ficus* sp.), Bamboo (*Bambusa* sp.) leaves, pulses, boiled paddy (*Oryza* sp.), commercial cattle mineral mixture was given as stall feed.

Most privately owned elephants (93%) were allowed to free range as well as given stall feed; various combinations of Horse gram (*Macrotyloma uniflorum*), Banyan stem (*Ficus*), Para grass (*Urochloa mutica*), Rice (milled grains of *Oryza sativa*) along with banyan, Banyan leaves along with grams, Boiled paddy, a boiled mixture of rice, grams and soybean (*Glycine max*), mixture of rice, ghee and grams was given.

All zoo elephants, except one, were allowed regulated periods of free-ranging opportunity along with regular stall-feed; Banyan (Ficus sp.) stems, carrot (*Daucus carota*), milled grains of wheat (*Triticum* sp.), rice (*Oryza*), garlic (*Allium sativum*), sugarcane (*Sachraum* sp.), Banana (*Musa* sp.) stem, *Dol* grass, Para (*Urochloa mutica*) grass, Pulses were given as stall feed. All regimes indicated comparable M-Rs as the ratings showed variation and consequent overlap, even though deviation from E-R was high for privately owned elephants

Female FC elephants were reported be in oestrus cycles, exposed to males, breeding opportunity was provided, had been observed to mate, male source was both wild and captive bulls, calf birth was reported with cows present during birth. Oestrus cycles were reported for one female elephant with private owners; three elephants were exposed to males; none of the females had calved. Rating for elephants with private owners showed greater deviation from E-R as well as non-uniformity in standards of observed parameters.

Forty percent of the male FC elephants were reported to be in musth; all were chained and isolated during this period. All males with private owners, exhibited musth; two elephants had killed humans; all were chained and isolated, watered during this period. Ratings were comparable across both the regimes showing a deviation of more than 60% from E-R.

Among FC elephants, occurrence of diarrhea/ worm infestation, uro-genital infection, toe nail cracks, pododermatitis and abscesses was reported. For privately owned elephants, occurrence of gastro-intestinal disorders, parasites, abscesses, lameness, toe nail cracks, anemia was reported. An adult female elephant was undergoing treatment for suspected tuberculosis. Abscesses, stomach related problems, parasites; lacerated wounds were reported for zoo elephants. While the deviation from E-R was relatively high for privately owned elephants, the variation observed in M-Rs for each of the regimes showed overlap in conditions.

All FC elephants had access to a veterinary doctor with 3-4y experience in treating elephants; frequency of visits was weekly/ fortnightly. Observed privately owned elephants had access to a veterinary doctor with 5- 20y experience; visits by doctors were "on call' or annual; records were not maintained. Two veterinary doctors with 25y and 15y experience were available for zoo elephants; doctors visited the zoo every day. Minimum deviation from E-R was noticed for zoo elephants, however, the variations observed within M-Rs for each regime showed overlap in the ratings.

For FC elephants, professional experience of handlers ranged from 6-30y, experience with a specific camp elephant ranged from 1-22y. For private owners, handlers' experience in the profession ranged from 2months to 32y, experience with a specific elephant ranged from 1.5months to 20y; 71%. For zoo handlers, professional experience ranged from 12-34y, with

a specific elephant, experience ranged from 0.6-5y. M-Rs showed comparable values across regimes implying similarity in standards.

Most FC handlers were tribals/ from the Muslim community. Mean annual salary drawn was Rs.91217/- ranging from Rs.72000-96000/-. For private owners, salary drawn ranged from Rs.12, 000/- to 24,000/- annually. All Zoo handlers belonged to the tribal/ Muslim community; salary drawn ranged from Rs.84, 000 to 95,000/- annually; insurance cover was not available; only one among three did not consume alcohol. Relatively low deviation from E-R for zoo handlers was offset by higher variation in the M-R.

Overall welfare status of elephants in Assam suggests that privately owned elephants showed lower occurrence of minimum deviation (0-10%) from E-R with FCs showing relatively higher occurrence of minimum deviation from E-R. The overall M-R was lowest for privately owned elephants followed by zoo and FCs.

Recommendations

Assam has a traditional association with elephant keeping— elephant keeping methods that provided near-natural living conditions for its captive population, in a forest environment with opportunity to interact with wild counterparts. With passing centuries and changed lifestyle, private owners of elephants were faced with economic hardships due to reduced demand for their animals. In this situation, three different options could be thought of to prevent migration of captive elephants from the state. It is worth repeating that, except for zoos, all elephants maintained in Assam (forest department or private owner) are exposed to natural living conditions. This dictum should motivate the authorities to prevent their captive population from migrating out.

The first option would be the demand-supply concept, i.e., the demand for elephants by the forest department can be met with by using elephants belonging to private owners. These elephants can be used for patrolling or as *koonkies*. For example, in 2004, WWF-India engaged 10-15 *koonkies* in a systematic manner to mitigate Human-elephant conflict in the worst affected area of Sonitpur district of Assam.

The second option would be supplementing the need for demand for elephants by creating a demand in tea plantations through use of the elephants in plantations in this state. Captive elephants can used for removal of fallen trees or as *koonkies* to drive away wild elephants entering plantations.

The third option would be for the Government to come forward to support private owners of elephants through various forms of support or subsidy. This would also motivate people to continue their long-standing tradition of keeping elephants..The fourth option would be creation of care centers for aged/handicapped elephants— maintenance of 4-5 elephants per center in different locations across the state. All these measures should be supplemented by initiating education programs providing details of past traditions of elephant keeping in this state. This may motivate people to maintain and preserve their cultural identity in elephant keeping methods.

In addition to this, the following regime wise welfare measured to be adopted

FC Elephants -

- 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. Reduced chaining duration of FC elephants to the barest minimum
    c. Efforts must be made to monitor the calves and sub adults so that they are not inadvertently transferred from the camps to less congenial surroundings.

d. 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.
e. The workload of these elephants must be periodically reviewed so that long term stress does not affect their health and performance.
f. Elephant foot problems must always be tended to immediately instead of waiting for the situation to worsen before the veterinarians act.

Zoo Elephants –

- Keeping in view the ban on keeping elephants in zoos, it would be beneficial if the elephants are not exposed to the rigors of camp life but are gradually integrated into it as part of their learning process from the protection of a care or rescue or rehabilitation center.

a) Guwahati Zoo should try to relocate their elephants to a care facility where the animals can get conditioned to living a natural free ranging life.

Privately Owned Elephants –

- These elephants require the most support and care.

a) Keeping the biological and behavioural needs of the elephants in mind by the owners— the elephants have to be provided specific durations/ periods after work in order to perform species-typical activities
b) Work has to be restricted and strictly supervised by independent agencies in order to minimize the ill-effects of over-work
c) Emphasis on the needs of elephants has to be increased by private owners: work schedule or trade should ensure maintenance of established social groups; provision for expression of species-typical behaviour such as walking, socializing, reproductive behaviours needs to be ensured.
d) As far as possible, breaking established bonds among individuals should be avoided; in instances where elephants cannot be maintained due to economic reasons, ways of maintaining established bonds with the new owners should be practiced.
e) Ownership needs to be reviewed and owners desirous of surrendering their elephants should return them to the State after due compensation.
f) An equally important feature is the maintenance of records: health/ service/reproductive status of the elephants along with documents relating to trade/transfer of elephants
g) Poor-owners cannot afford veterinarians or are located in distant places. Most common problems are wounds and abscesses caused by ill-fitting gear, ankush usage and badly tended feet leading to pododermatitis and other complications.

All avenues of illicit sale should be closed urgently. Elephants, allegedly, are being illegally trafficked to bordering Nepal and Myanmar, through forest routes. Display at Sonepur Mela of freshly caught sub adults needs to be checked by institutions like Wildlife Crime Control Bureau (WCCB) and Traffic India. There is open trade happening in the State and there are witnesses to the same in Nowgong District of the State.

Introduction

The occurrence of elephants, the myths, the lore associated with the species in the north-eastern region has been written about by the British during their rule in India (Sanderson, 1879). The species has been captured and used for human activities since the time of the Ahom Kings; the region has been a source of capture and trade in elephants (Stracey, 1963). Sarma et al., (2003) mention that the North-eastern region of India accounts for 55% of the captive population of elephants. This goes to show the history of not only capture/ trade but also maintenance of elephants in captivity in this region.

Objective

Management systems vary in the conditions provided for elephants in captivity; elephants' needs will be met in different degrees and kinds as the management changes. Hence, it is this report's aim to:

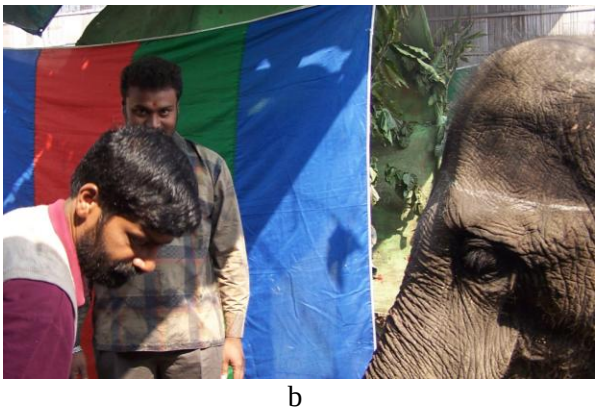
- Assess the welfare status of elephants in Assam under different management regimes
- Assess the professional experience and socio-economic status of handlers (mahouts/ cawadis)

Method

Elephants cannot be considered to be domesticated, as they have not been bred selectively in captivity. In addition, the present population of animals contains a number of wild caught individuals. Hence, the biological and ecological needs, in terms of those observed in the wild, have to be met if the well-being of the captive elephants has to be maintained.

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). The existing situation in captivity has been rated by a team of experts, from different fields and the data collected from the ground survey was compared with expert rating to assess the welfare status of elephants kept in captivity in Assam

a



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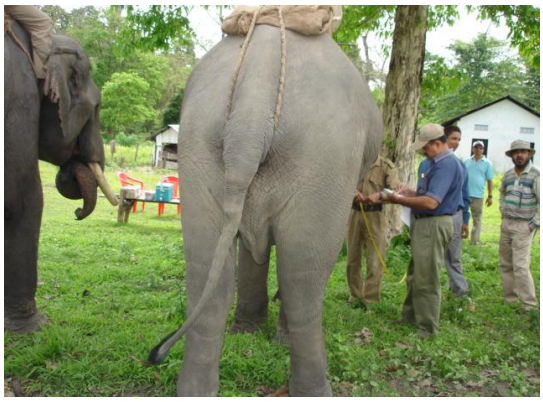


c d

Figures 1a,b,c and d: Data collection, observations of elephants and interactions with elephants mahouts from forest camp (a) and private ownerships (b)

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 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 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

Three regimes: Forest Camps (FCs), Individuals owning elephants (Private ownership, Pvt.) and a Zoological garden (Zoo) were surveyed. FCs and the Zoo are government run institutions. A total of 118 elephants were observed, with 71 females and 47 males comprising the survey. Figure 2 gives the sex/ age-class distribution, Figure 2a, b, c, d, e and f gives examples of different age and sex class of captive elephants found in Assam. 15%, of all the elephants sampled in the state, comprised those less than 6y while 18% formed those more than 40yrs. 49% of all the elephants were constituted by the age group between 16-40yrs.

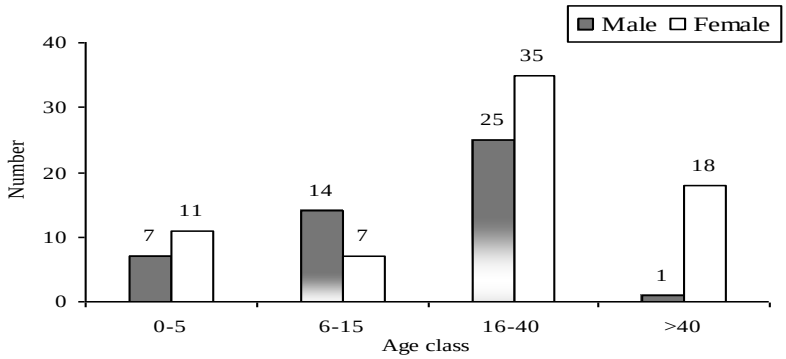


Figure 2: Age-class distribution of elephants

a

b

c

d

e

f

Figures 2a,b,c,d,e and f: Different age and sex classes of elephants found in captive population of Assam

Figure 3 and 4 give the age-class distribution based on management regimes for males and females respectively.

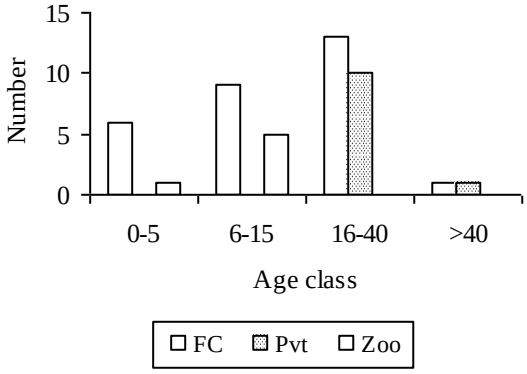


Figure 3: Age class for males

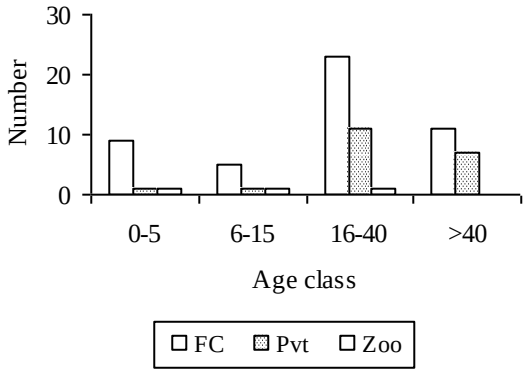


Figure 4: Age class for females

- Elephants from 16-40y accounted for the highest numbers in both FCs and with private owners, for both males and females.
- More number of calves was observed in FCs when compared to the other two regimes.
- No male calves or males aged between 6-15y were maintained by private owners.
- There were no males between 16-40y and no male/ female aged more than 40y in the zoo.

Update of population status of captive elephants from forest camps

As part of an All India survey, data on captive elephants was collected from different regimes in 2006 in Assam. In 2011, data on sex, birth and death of captive elephants in forest camps and a zoo in Assam was updated. Data on 87 elephants had been collected in 2006, comprising 36 males and 51 females across 5 forest camps and 1 zoo. Table 1 gives distribution of elephants across forest camps and the Assam state zoo in 2011.

Considering all elephants together (n= 161), birth rate was 4% across a period of 5 years. Mortality appeared to be 2% across 5 years. Comparing data from 2006 with that of 2011, for forest camps common to both years, an increase in number of elephants was observed. An increase of 57% in total number of elephants (n= 76, 2006 data) was noticed with 36% for males and 21% for females.

As compared to 14 elephant deaths reported during the period 2006 - 2011, the number of births was 22, accounting for 51% of the increase in numbers. 50% of the observed population in FCs, common to both years, comprised of elephants in the age class 21-40 years and 1-5 years during 2006. The class 16-40 years forms a breeding group capable of adding to a captive population. Figure 5 gives the distribution of age class for females in 2006 for FCs common to both years.

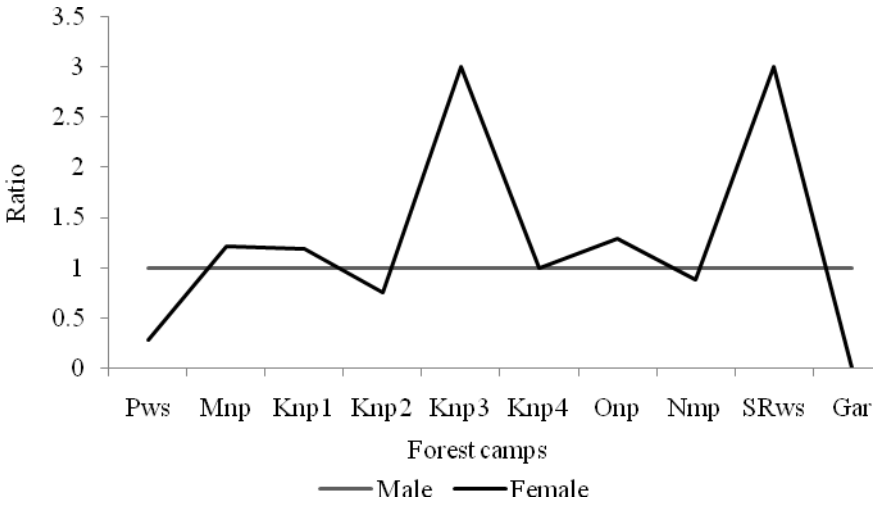
Table 1: Distribution of elephants in Assam Forest camps and zoo

Park/zoo	Total no of elephants	male	female	Death during last 5 yrs	Birth during last 5 yrs	Change in numbers after 5 years
Assam state zoo*	9	6	3	0	0	0
Pobitora WL Sanctuary	9	7	2	1	2	1
Manas National Park	31	14	17	3	6	3
Kaziranga National Park						
A) Kohora Range	35	16	19	3	7	4
B) Agoratoli Range	7	4	3	2	2	0
C) Bagori Range	16	4	12	1	4	3
D) Ghorakati Range	2	1	1	1	0	-1
Orang National Park	32	14	18	2	14	12
Nameri National Park	15	8	7	3	1	-2
Sonai Rupai WL Sanctuary	4	1	3	0	0	0
Gabharu beat, Ameribari Range	1	1	0	2	0	-2
Total	**161**	**76**	**85**	**18**	**36**	**18**

*For Assam state zoo, 2006 data for total elephants is used as there was no update for 2011 available till the publication of the document.

Figure 5: Age class of female elephants in FCs (2006)

The number of births was greater than the mortality observed considering all the forest camps (n= 7; four ranges of Kaziranga clubbed as one) during 2011. Figure 6 shows the sex ratio of male: female for each of these camps in 2011. Overall ratio was 1:1.2; if the data from zoo was also included, the ratio was 1:1.1. Except for four camps, the ratio was nearly equal.



Pws: Pobitora WL Sanctuary Mnp: Manas National Park Knp1: Kaziranga NP (Kohora range) Knp2: Kaziranga NP (Agoratoli range) Knp3: Kaziranga NP (Bagori range) Knp4: Kaziranga NP (Ghorakati range Onp: Orang National Park Nmp: Nameri National Park SRws: Sonai Rupai Wildlife sanctuary Gar: Gabharu beat, Ameribhari range

Figure 6: Sex ratio (Male: Female) in observed camps (2011)

Interestingly, there appeared to be no correlation between sex ratio and number of births (Figure 7), correlation coefficient was 0.04. This would imply mating between wild males and captive females.

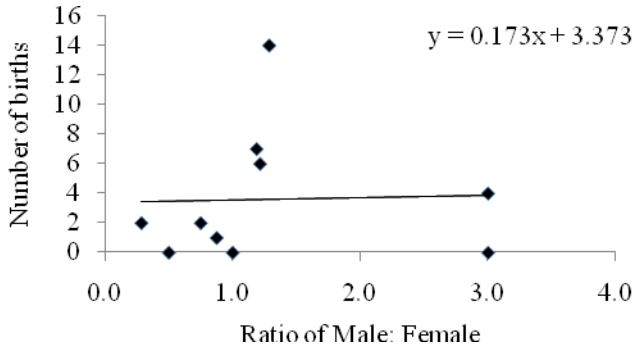
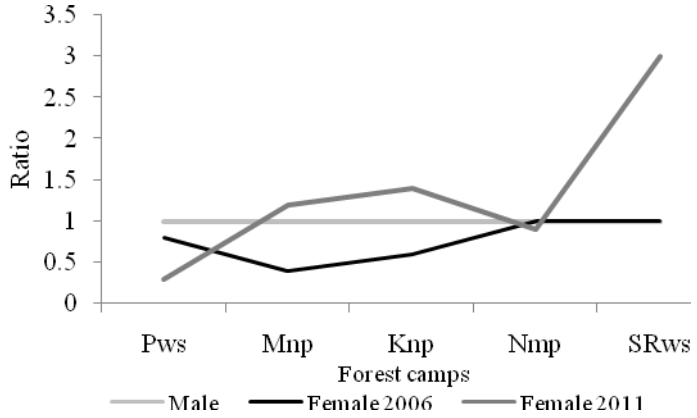


Figure 7: Correlation between sex ratio and number of births (2011)

Sex ratio data for the years 2006 and 2011 was compared (Figure 8) for the five FCs common to both years. The graph shows a nearly complementary sex ratio between the two years. Overall sex ratio was 1:1.7 in 2006 and 1:1.2 in 2011 (male: female).



Pws: Pobitora WL Sanctuary Mnp: Manas National Park Knp: Kaziranga NP
Nmp: Nameri National Park SRws: Sonai Rupai Wildlife sanctuary

Figure 8: Comparison of sex ratio (Male: Female) between FCs in 2006 and 2011

Source

Change of living conditions is experienced by elephants when transferred across locations/ owners. This change is drastic when an elephant is captured from the wild and brought into captivity.

- 54% of all elephants (N= 113), considered irrespective of regimes, were caught/ rescued from the wild
- Among FC elephants, most (59%, N= 75) were captive born; 39% were caught/ rescued from the wild
- Most privately owned elephants were wild caught (86%, N= 28); 7% were captive born
- All zoo elephants were rescued from the wild

Figures 9a and 9b give the comparative rating across regimes and deviation from E-R respectively. FCs showed relatively less deviation; maximum deviation was observed for privately owned elephants indicating drastic change in the form of wild elephants being brought into captivity.

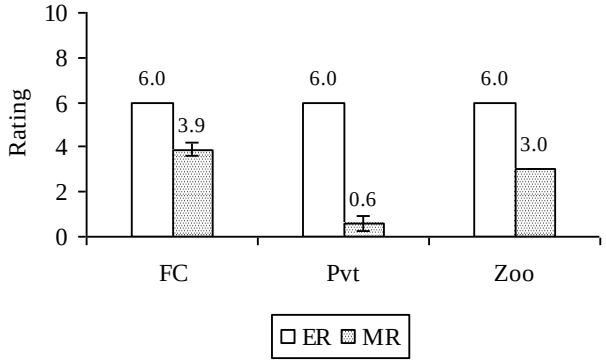


Figure 9a: Comparison of E-R and M-R for source across observed management regimes

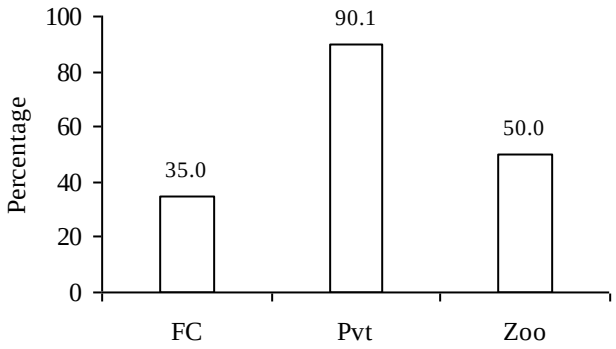


Figure 9b: Percentage wise deviation from E-R for source of elephants

Mahout changes/elephant

Handlers have to develop a relationship with their elephants wherein the elephants perform their tasks from a sense of trust rather than fear (Chowta, 2010). This relationship is broken if handlers are changed frequently.

- A mean of three handlers had been changed per FC elephant
- On an average, four handlers had been changed per privately owned elephant

Figures 10a and 10b give the comparative rating across regimes and deviation from E-R respectively. Both institutions showed more than 50% deviation from the prescribed norms.

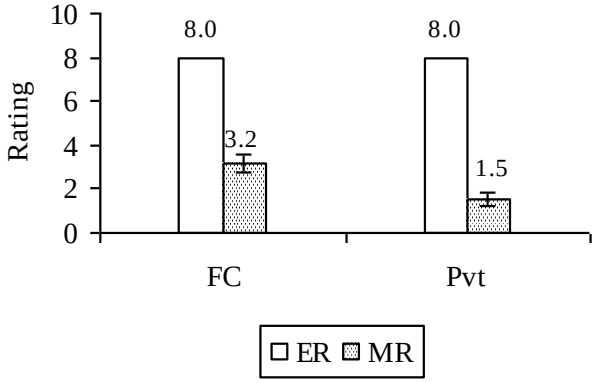


Figure 10a: Comparison of E-R and M-R for mahout change across observed management regimes

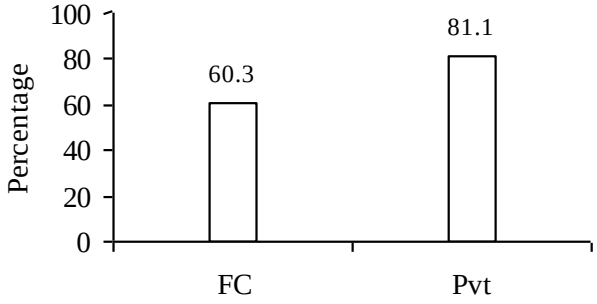


Figure 10b: Percentage wise deviation from E-R for mahout change

Shelter

The distances traveled across varied landscape in the wild (Sukumar, 2006) is curtailed in captivity not only by limited space but also by restrictions imposed on movement. (Poole and Granli, 2009) state that elephants are on the move for most parts while engaging in species-typical activities; limited space in captivity inhibits a whole range of species-specific activities such as foraging, socializing, searching for mates, etc.

- Most FC elephants, except two, had access to forests; the elephants were subject to a combination of being tied within the camp site or left to free range in the forest
- Privately owned elephants were tethered to trees when not working, exposed to natural (earthen) flooring without any man-made roofing
- Zoo elephants were kept in enclosures, they also had access to a forest area of limited size (Figures 11a,b,c and d)

a

b

c

d

Figures 11a,b,c and d: Shelter available for elephants from different management regimes, forest camp (a), private (b and c) and zoo (d)

Figures 12a and 12b give the comparative rating across regimes and deviation from E-R respectively. M-R for FCs and zoo were comparable, considering the variation observed within each, showing relatively low deviation from E-R. Minimum M-R was observed for privately owned elephants, but based on fewer sub-parameters.

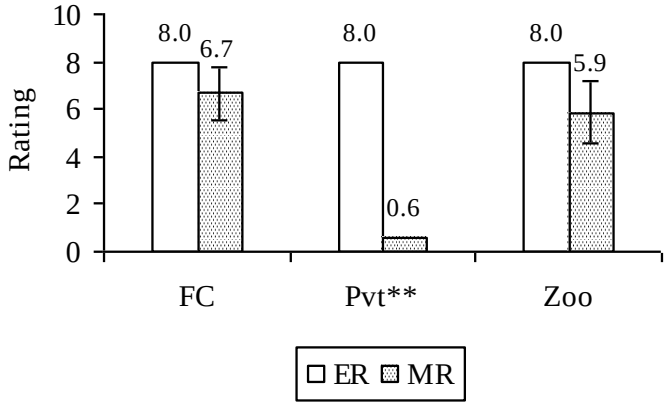
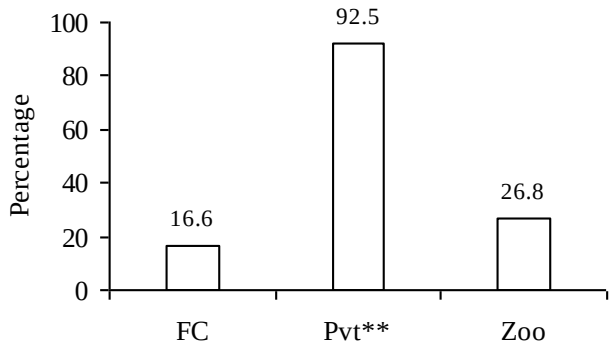


Figure 12a: Comparison of E-R and M-R for 'shelter' across observed management regimes



**: Rating based on two sub-parameters only

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

Water

Availability of running water for drinking and bathing of elephants is an essential pre-requisite for a captive elephant system. Their need for water also has a thermoregulatory function (Chowta, 2010). Scrubbing the animals, while bathing, is important in removal of ectoparasites, cleaning superficial wounds (op.cit).

- Several sources of water were available for FC elephants: river, stream, lake, pond and taps; 42% used only rivers/ streams, remaining used a combination of different sources; bath frequency was 1-2 times/ day, natural scrub materials were used while bathing
- For privately owned elephants, different water sources were available: ponds/ taps/ river/ stream; all elephants had access to rivers/streams with 38% (N= 29) using this

as their sole water-source; bath frequency was 2times/ day, natural materials and/ or stone was used as a scrub

- Tap and pond water was the source for zoo elephants; bath frequency was 2times/day in summer and once per day during winter; natural materials and stone were used as scrub.

Figures 13a, b, c and d show the source of water available for elephants from different management regimes in Assam

a b c d

Figures 13a, b, c and d:Source of water available for elephants from different management regimes in Assam

Figures 14a and 14b give the comparative rating across regimes and deviation from E-R respectively. M-R was comparable across all regimes due to the variation observed for each regime implying non-uniformity in the standards for the parameters observed. In terms of deviation from E-R, zoo showed relatively greater value.

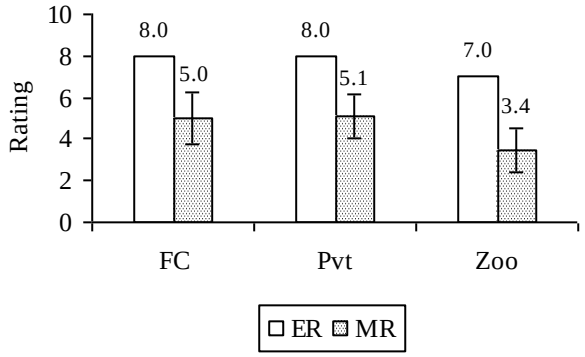


Figure 14a: Comparison of E-R and M-R for 'water' across observed management regimes

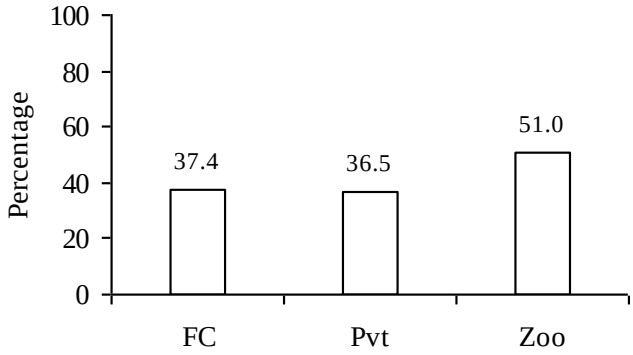


Figure 14b: Percentage wise deviation from E-R for water

Sleep

Wild elephants may sleep or rest several times in a day (Kurt and Garai, 2007); the practice of restraining elephants in captivity may impose restrictions on the ability of the animal to choose appropriate sleeping place/ duration.

- FC elephants were tethered in the open (*Pilkhana*)/in the camp site/left to free range in the forest; sleep duration varied from 1-6hrs.
- 85% (N= 27) of privately owned elephants were chained in their camp site
- Zoo elephants were chained in their enclosures at night

Figures 15a and 15b give the comparative rating across regimes and deviation from E-R respectively. Privately owned elephants showed relatively low deviation from E-R, however, this value was close to 50% indicating deviation to this extent from the prescribed norms; rating for zoo was based on a single sub-parameter. With availability of more information, the M-R for zoo may be different. Variation observed in M-R for FCs implies non-uniformity in standards of sub-parameters.

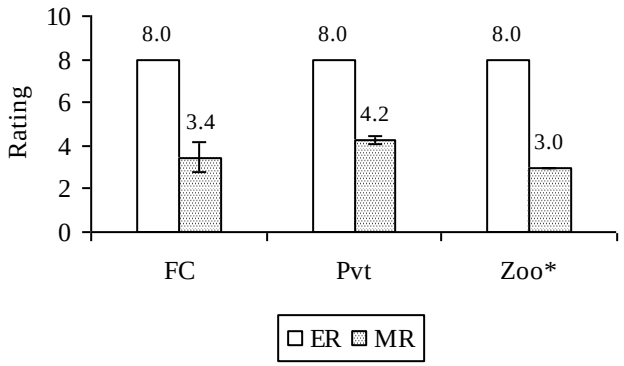
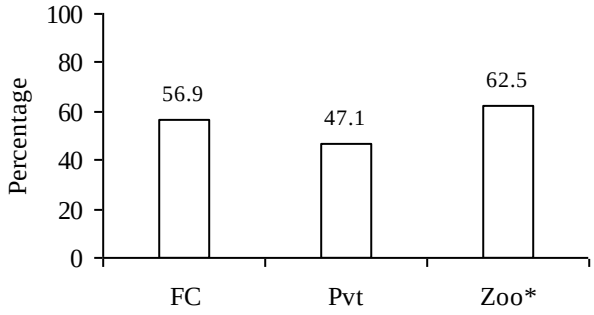


Figure 15a: Comparison of E-R and M-R for 'sleep' across observed management regimes



*: rating based on single sub-parameter

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

Walk

Insufficient opportunities to walk may lead to foot problems (Olson, et al., 1994). Walking forms a major activity for wild elephants; they have been observed to traverse vast distances while foraging and performing other species-typical activities (Poole and Granli, 2009).

- All FC elephants were walked in the adjoining forests
- All privately owned elephants were given opportunity to walk, distance ranged from 1- 40kms
- Zoo elephants were walked within the zoo premises, distance of 3km

Figures 16a, b, c and d show the scope for walks available for elephants from different management regimes in Assam

a

b

c

d

Figures 16a,b,c and d: Scope for walk from different management regimes

Figures 17a and 17b give the comparative rating across regimes and deviation from E-R respectively. Variation in the M-Rs of private and zoo elephants implied overlap of values and non-uniformity in standards.

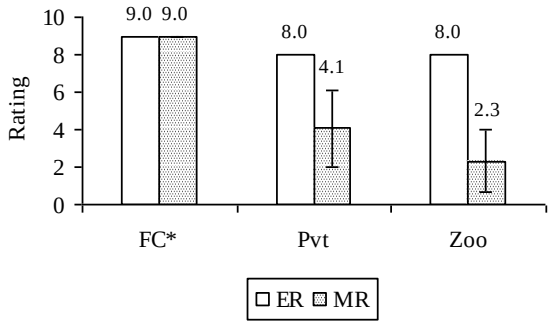
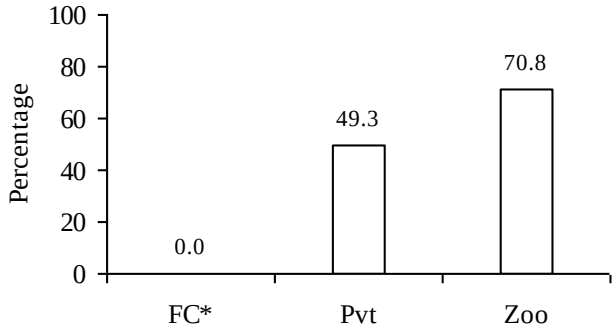


Figure 17a: Comparison of E-R and M-R for 'walk' parameter across observed management regimes



*: rating based on single sub-parameter

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

Social interaction

Female elephants live in groups of related individuals (Vidya and Sukumar, 2005); adult males have been observed together without occurrence of aggressive interactions (McKay, 1973); young and growing males need to live in groups too as it gives them an opportunity to learn about others in the group (Poole and Moss, 2008). It can be said that presence and maintenance of groups in captivity is of paramount importance to elephant well-being.

- 96% of FC elephants (N= 77) were allowed to interact with other elephants, mean duration was 6hrs
- All privately owned elephants were provided opportunity to interact; mean number of elephants per group was three, duration of interaction ranged from 1-24 hrs
- All zoo elephants were allowed to interact, but duration was restricted to 2- 2.5 hrs

Figures 18a, b, c and d show the scope for social interaction from different management regimes in Assam

a

b

c

d

Figures 18a,b,c and d: Scope for social interaction among elephants from different management regimes; forest camps (a and b), kept alone and interactions with other elephant in private ownership (c and d)

Figure 19a and 19b give the comparative rating across regimes and deviation from E-R respectively. Relatively low deviation from E-R was observed for FCs, variation in the M-Rs of all the regimes ensured overlap of rating. Hence, even though FCs showed lesser deviation, their E-R could be on par with that of the other regimes.

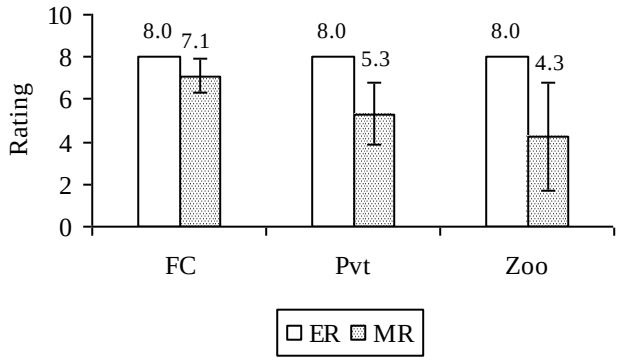


Figure 19a: Comparison of E-R and M-R for 'social interaction' across observed management regimes

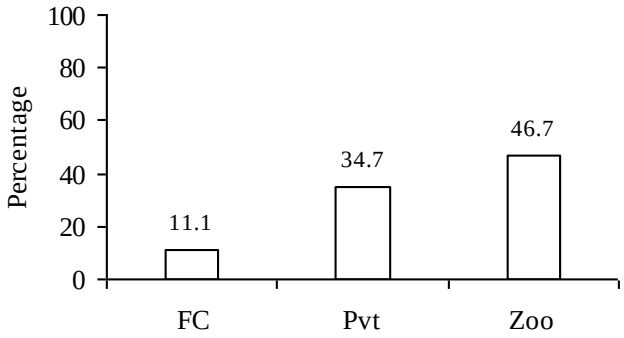


Figure 19b: Percentage wise deviation from E-R for social interaction

Chaining

Restriction on movement through chaining hinders performance of species-typical activities by elephants.

- All FC elephants were tethered to a place for varying durations; 97% of FC elephants (N= 78) were allowed to free range at night using drag-chain and hobbles
- Privately owned elephants were all tethered to a place for varying durations; 80% (N= 25) were allowed to free range at night with drag-chain/hobbles
- Zoo elephants were tethered in their enclosure; hobbles were used for elephants left to free range

Figures 20a, b, c and d show the types of chains and the body parts where they are used in different management regimes in Assam

a

b

c d

Figures 20a,b,c and d: Status of chaining observed in different management regimes, forest camps (a and b), private ownership (c and d)

Figures 21a and 21b give the comparative rating across regimes and deviation from E-R respectively. There was no distinction between FC and Private elephants as M-Rs showed overlap in their variation; maximum deviation from E-R was observed for zoo elephants.

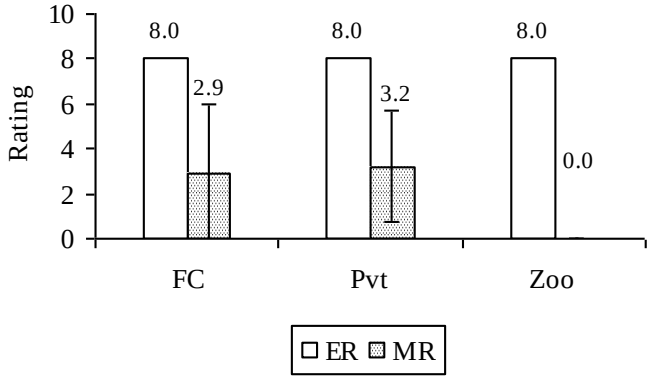


Figure 21a: Comparison of E-R and M-R for ‘chaining’ across observed management regimes

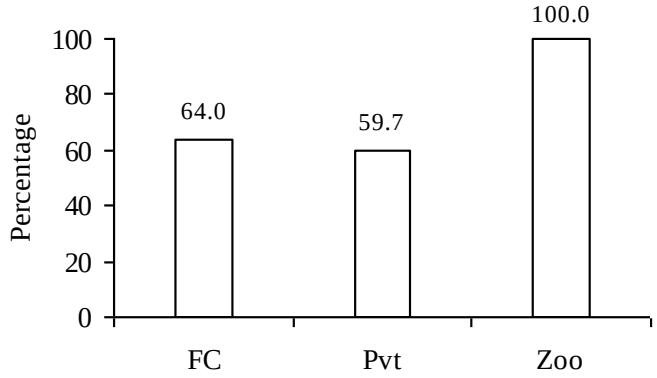


Figure 21b: Percentage wise deviation from E-R for chaining

Behaviour

Elephants which are aggressive towards others or towards people will be difficult to handle in captivity. Such behaviour could also imply bad handling by the management. In addition, occurrence of stereotypy is considered to be an indicator of poor captive conditions (Bradshaw, 2007).

- Most FC elephants (90%, N= 76) were described as reliable/ quiet; stereotypy was observed in two elephants
- Smaller percentage of privately owned elephants (67%, N= 27) were described as reliable/quiet; incidents of running amok was reported for 33% of the elephants (N= 15); stereotypy was not observed for any
- Zoo elephants were described as quiet/reliable; none exhibited aggression towards people

Figures 22a and 22b give the comparative rating across regimes and deviation from E-R respectively. While deviation from E-R for FC and zoo elephants was relatively low, their rating was based on fewer sub-parameters. Higher deviation from E-R for privately owned elephants was observed, the variation in the M-R also indicates non-uniformity in the standards.

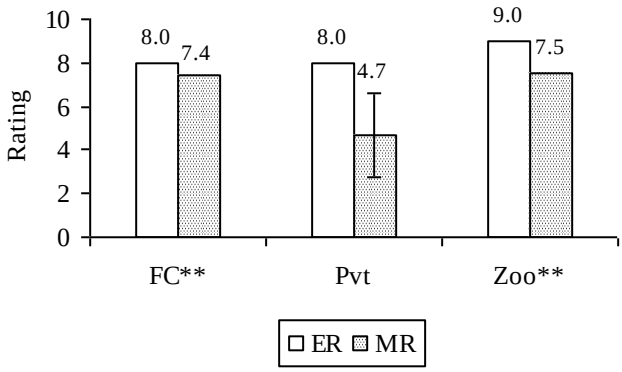
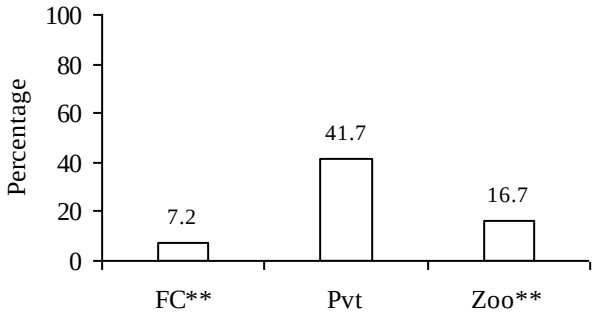


Figure 22a: Comparison of E-R and M-R for 'behaviour' across observed management regimes



**: Rating based on two sub-parameters only

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

Work

The work performed by captive elephants maybe similar to their natural repertoire. Conditions which stress the animal through overwork/performance of alien behaviours/ inability by the animal to exercise options, will lead to poor welfare conditions.

- 76% of FC elephants (N= 71) were used for work such as patrolling, safari rides for tourists; tourists were carried on howdah weighing a mean of 56 kg; the elephants were worked for a mean duration of 3.4hrs
- All privately owned elephants (N= 29) were used for work such as logging, *Koonkie*, patrolling, participating in festivals; timings ranged from early morning to noon and/ or in the afternoon; *Koonkies* were worked at night
- Zoo elephants more than 12y of age were used for work such as carrying tourists or fodder; work duration was 1-1.5hrs in the afternoon

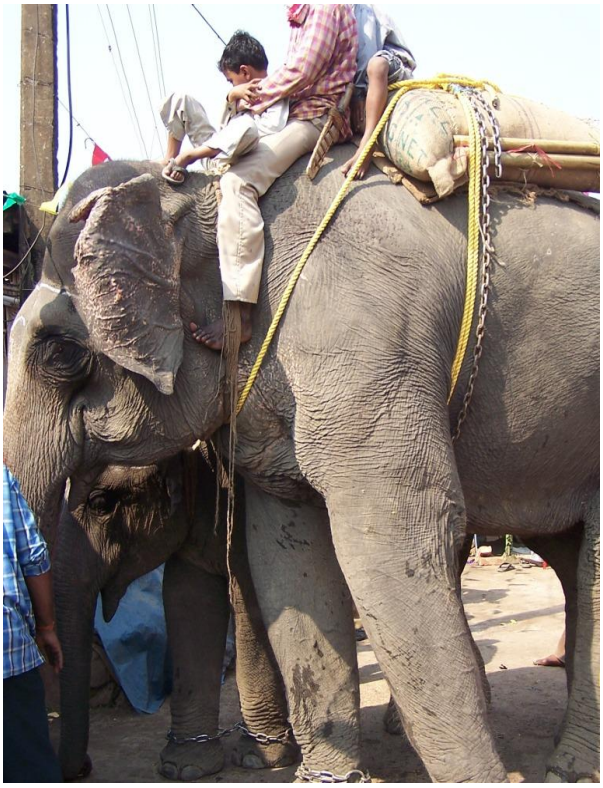
Figures 23a, b, c, d, e and f: Work types captive elephants are exposed to from different management regimes,

a

b

c

d



e

f

Figures 23a,b,c,d,e and f: Work types captive elephants are exposed to from different management regimes, carrying tourists in forest camp (a and b), forest camp elephants attending annual elephant festival (c and d), carrying public (e) and returning from cine shooting (f) of privately owned elephants

Figures 24a and 24b give the comparative rating across regimes and deviation from E-R respectively. Ratings across regimes were comparable indicating similarity in conditions irrespective of regimes.

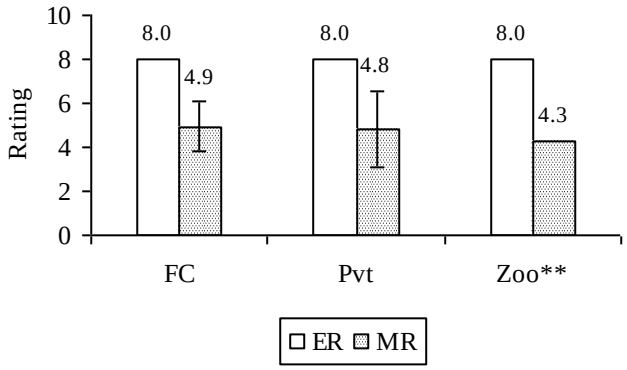
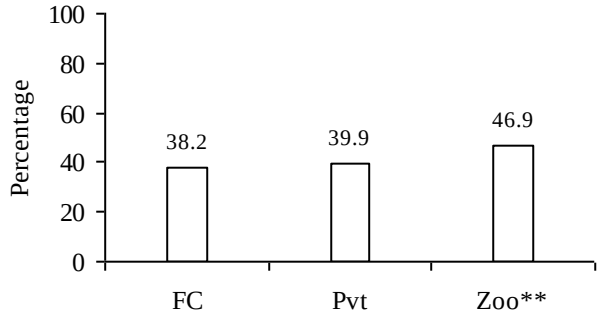


Figure 24a: Comparison of E-R and M-R for 'work' across observed management regimes



**: Rating based on two sub-parameters only

Figure 24b: Percentage wise deviation from E-R for work

Food

Elephants feed on a wide variety of plants (Sukumar, 1991), manipulating their food by using their trunk, feet or tusk (Kurt and Garai, 2007). The opportunities presented while grazing/browsing in forest conditions cannot be replicated when they are stall fed. In captivity, it is important to maintain a chart of the ration provided for elephants as any deviation from the normal maybe an indication of ill-health.

- All FC elephants, except for two rescued calves, were provided stall feed as well as free-ranging opportunity; Banyan stem (*Ficus* sp.), Bamboo (*Bambusa* sp.) leaves, pulses, boiled paddy (*Oryza* sp.), commercial cattle mineral mixture was given as stall feed.
- Most privately owned elephants (93%, N= 27) were allowed to free range as well as

given stall feed; various combinations of Horse gram (*Macrotyloma uniflorum*), Banyan stem (*Ficus*), Para grass (*Urochloa mutica*), Rice (milled grains of *Oryza sativa*) along with banyan, Banyan leaves along with grams, Boiled paddy, a boiled mixture of rice, grams and soybean (*Glycine max*), mixture of rice, ghee and grams was given; ration chart was not maintained

- All zoo elephants, except one, were allowed regulated periods of free-ranging opportunity along with regular stall-feed; Banyan (Ficus sp.) stems, carrot (*Daucus carota*), milled grains of wheat (*Triticum* sp.), rice (*Oryza*), garlic (*Allium sativum*), sugarcane (*Sachraum* sp.), Banana (*Musa* sp.) stem, *Dol* grass, Para (*Urochloa mutica*) grass, Pulses were given as stall feed; ration chart was maintained

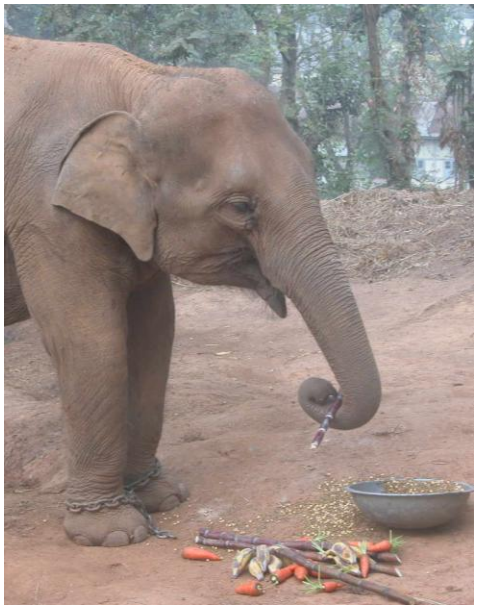
Figures 25a, b, c, d, e and f show the types of food items captive elephants are exposed to from different management regimes

a

b

c

d



e

f

Figures 25a,b,c,d,e and f: Types of food items captive elephants are exposed to from different management regimes; forest camp elephants returning after free range and carrying their food (a and b), items of food given at the forest camp (c and d), food items given at zoo (e), food items given to private elephants (f)

Figures 26a and 26b give the comparative rating across regimes and deviation from E-R respectively. All regimes indicated comparable M-Rs as the ratings showed variation and consequent overlap, even though deviation from E-R was high for privately owned elephants.

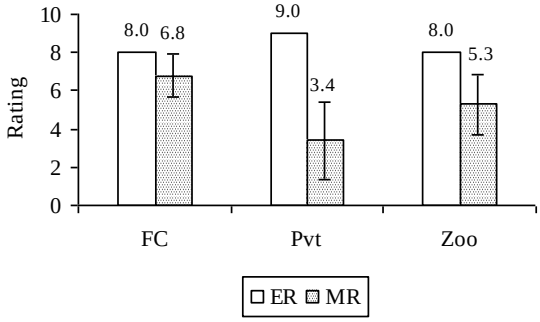


Figure 26a: Comparison of E-R and M-R for 'food' across observed management regimes

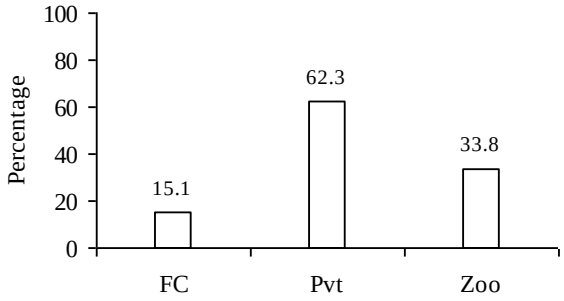


Figure 26b: Percentage wise deviation from E-R for food

Reproductive status

Normal reproductive functioning in adult elephants can be an indicator of normal physical health as well as adequate welfare conditions in captivity. Reproductive functioning includes all aspects— from occurrence of oestrus/ expression of male reproductive behaviour to the presence of cow elephants during parturition and having scope for males to sire offspring

Female reproductive status

- Female FC elephants were reported 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
- Oestrus cycles were reported for one female elephant with private owners; three elephants were exposed to males; none of the females, for which data was available, had calved

Figures 27a and 27b give the comparative rating across regimes and deviation from E-R respectively. Figures 28a, b, c, and d show the females with calves indicating their reproductive status from different management regimes. FCs showed higher M-R with lesser variation while privately owned elephants showed lower M-R with greater variation. Rating for elephants with private owners showed greater deviation from E-R as well as non-uniformity in standards of observed parameters.

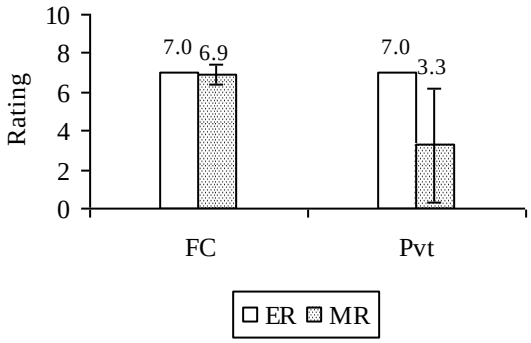


Figure 27a: Comparison of E-R and M-R for female reproductive status

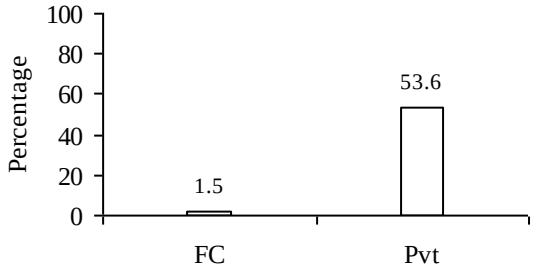


Figure 27b: Percentage wise deviation from E-R for female reproductive status

a

b

c

d

Figures 28a,b,c and d: Status of reproduction in female elephants from different management regimes, calves born to elephants from forest camps (a, b and c); elephant claves rescued from the wild and rehabilated (d)

Male reproductive status

- With reference to the status of musth 40% of the males from FC were reported to be in musth (N= 10); all were chained and isolated during this period
- All males (N= 6) with private owners, for which data was available, exhibited musth; two elephants had killed humans; all were chained and isolated, watered during this period (see figures 29a and b for reproductively active males from FC and private ownership)

a

b

Figures 29a and b: Reproductive status of males, adult males found in both forest camp (a) and private ownership (b)

Figures 30a and 30b give the comparative rating across regimes and deviation from E-R respectively. Ratings were comparable across both the regimes showing a deviation of more than 60% from E-R.

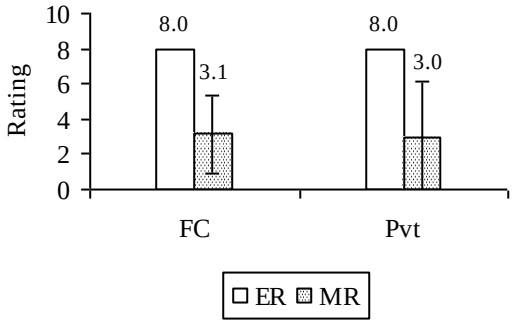


Figure 30a: Comparison of E-R and M-R for male reproductive status

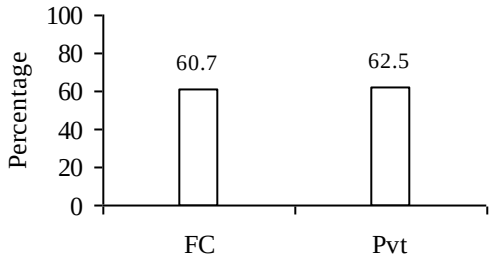


Figure 30b: Percentage wise deviation from E-R for male reproductive status

Health and veterinary care

Past study on the health of captive elephants in Assam (Sarma, et al., 2003) showed occurrence of parasitic infections, foot problems, abscesses, among other health issues. It is important for timely veterinary care to be provided if the animals' health has to be maintained.

- Among FC elephants, occurrence of diarrhea/ worm infestation, uro-genital infection, toe nail cracks, pododermatitis and abscesses was reported; deworming was practiced once in six months; immunization against hemorrhagic septicemia/Anthrax/ tetanus/ foot&mouth disease was done annually; samples of blood/ dung/ urine were tested as and when required
- For privately owned elephants, occurrence of gastro-intestinal disorders, parasites, abscesses, lameness, toe nail cracks, anemia was reported; deworming was done once in 6 months; blood/ urine/ dung samples were tested for 83% of the elephants observed (N= 7); an adult female elephant was undergoing treatment for suspected tuberculosis
- Abscesses, stomach related problems, parasites, lacerated wounds were reported for zoo elephants; all elephants were dewormed once in 6 months, immunized annually against foot and mouth disease, hemorrhagic septicemia, anthrax, rabies

Figures 31a and b show injuries due to chaining elephants and attack by animals like rhino

a b

Figures 31a and b: Injuries caused due to chaining of elephants and a male elephant attacked by rhino

Figures 32a and 32b give the comparative rating across regimes and deviation from E-R respectively. While the deviation from E-R was relatively high for privately owned elephants, the variation observed in M-Rs for each of the regimes showed overlap in conditions.

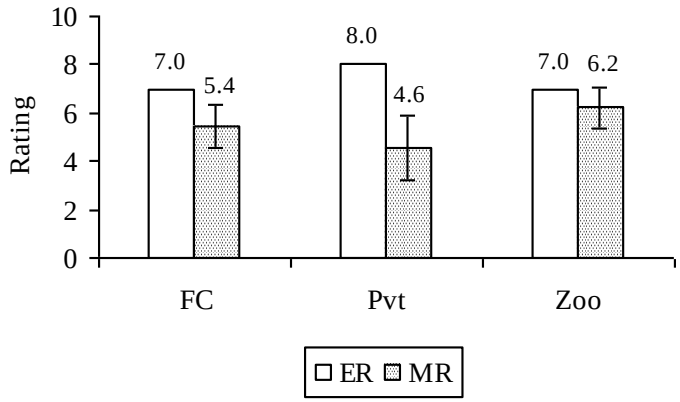


Figure 32a: Comparison of E-R and M-R for 'health' across observed management regimes

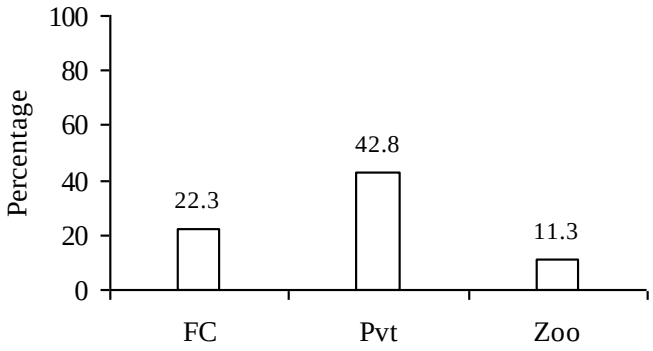


Figure 32b: Percentage wise deviation from E-R for health

Veterinary personnel and infrastructure (facilities)

Availability of veterinary personnel with relevant experience is integral to maintaining health of captive elephants. Inadequate facilities will hinder smooth functioning of the organization/ individual establishment.

- All FC elephants had access to a veterinary doctor with 3-4y experience in treating elephants (Figures 33 a and b) frequency of visits was weekly/ fortnightly; Service register/ medical register was maintained; veterinary clinic with limited medical facility, staff quarters, cooking shed/ vessels, provision shed, animal stand and camp site was available
- Observed privately owned elephants (N= 6) had access to a veterinary doctor with 5-20yrs experience; visits by doctors were "on call' or annual; records were not maintained
- Two veterinary doctors with 25yrs and 15y experience were available for zoo elephants; doctors visited the zoo everyday; facilities such as staff quarters, cooking shed and vessels, animal stand, camp site, *Pilkhana*, Provision shed, Calf shed, Clinical laboratory, medicine store were available

a

b

Figures 33a and b: Veterinary care and other facilities available for captive elephants from forest camps; Elephants often used as good darting platform in the medical management of them (a); Exploring for a bullet by a veterinary doctor

Figures 34a and 34b give the comparative rating across regimes and deviation from E-R respectively. Minimum deviation from E-R was noticed for zoo elephants, however, the variations observed within M-Rs for each regime showed overlap in the ratings. This implies a comparable state for that parameter across the regimes.

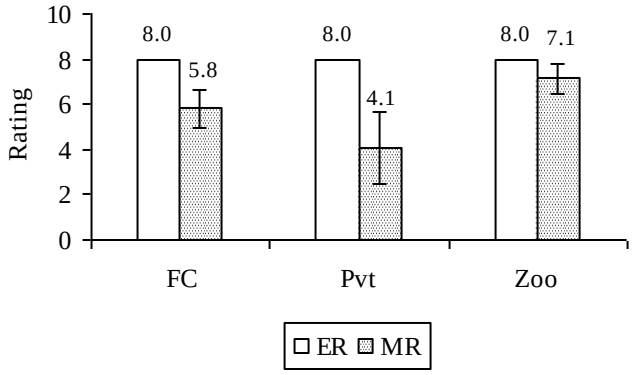


Figure 34a: Comparison of E-R and M-R for veterinary personnel and infrastructure across observed management regimes

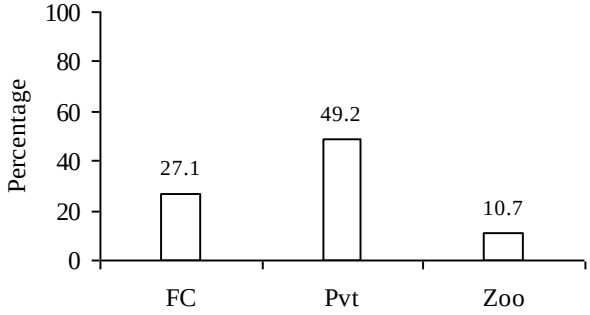


Figure 34b: Percentage wise deviation from E-R for veterinary personnel and infrastructure

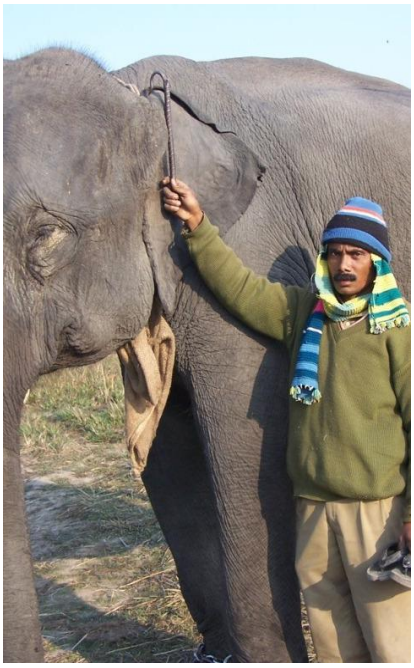
Handlers' (mahouts/ cawadis) professional experience and socio-economic status

Handlers are indispensable to a captive elephant management system (Chowta, 2010). Their knowledge and their socio-economic profile, if not upto satisfactory standards, will lead to poor welfare conditions for all involved. Mean age of handlers (considering all handlers across the regimes) was 39yrs (SE= 1.4, N= 36), ranging from 22- 54yrs.

Professional experience

- For FC elephants, professional experience of handlers ranged from 6-30y, experience with a specific camp elephant ranged from 1-22y; 96% handlers (N= 23) chose this profession to earn an income; Ankush, *Gupti* (a brass tool with a sharp edge), *Khukri* & bamboo stick were used to control elephants
- For private owners, handlers' experience in the profession ranged from 2months to 32y, experience with a specific elephant ranged from 1.5months to 20y; 71% (N= 7) handlers had chosen this profession as a means of employment; tools used to control elephants were *Khukri*, *gupti* (foot-length goad with small metal tip at one end), stick, wooden ankush, bamboo stick
- For zoo handlers, professional experience ranged from 12-34y. With a specific elephant, experience ranged from 0.6-5y; all had chosen this profession as a means of employment; tools used were wooden stick/ *Khukri* to control their elephant

Figures 35a,b,c,d,e and f show profiles of elephant mahouts from different management regimes in Assam



a

b

c

d

e

f

Figures 35a,b,c,d,e and f: Profiles of elephants handlers from different management regimes, elephants mahouts from forest camps (a and b), from private ownership (c,d and e) and from zoo (f)

Figure 36a and 36b give the comparative rating across regimes and deviation from E-R respectively. M-Rs showed comparable values across regimes implying similarity in standards. Standards were not uniform for the features observed as shown by the variation in the M-Rs of all the regimes.

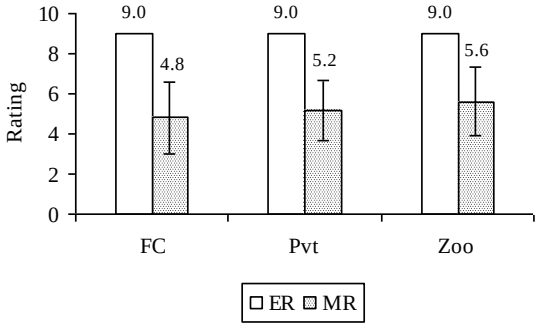


Figure 36a: Comparison of E-R and M-R for handlers' professional experience

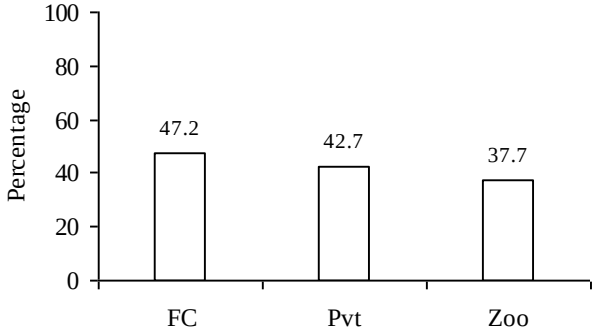


Figure 36b: Percentage wise deviation from E-R for handlers' professional experience

Socio-economic status

- Most FC handlers (68%, N= 22) were tribals/ from the Muslim community; a small per cent (1%) had a father/ grandfather working in the same profession; mean annual salary drawn was Rs.91217/- (N=23) ranging from Rs.72000-96000/-; number of children per family ranged from 1-5; insurance cover was not provided for any handler; 57% consumed alcohol
- Among private owners, 43% (N= 7) handlers were not educated; Salary drawn ranged from Rs.12,000/- to 24,000/- annually; number of children per family ranged from 0 - 3; insurance cover was not available for any handler; 86% (N= 7) consumed alcohol
- All Zoo handlers belonged to the tribal/ Muslim community; 74% (N = 23) were educated; salary drawn ranged from Rs.84,000 to 95,000/- annually; insurance cover was not available; only one among three did not consume alcohol

Figures 37a and 37b show the housing facilities available to elephant mahouts from FC (a and b)

a

b

Figures 37a and b: Housing facilities available to elephant mahouts from FC (a and b)

Figure 38a and 38b give the comparative rating across regimes and deviation from E-R respectively. Variation within M-R of each regime ensured overlap of conditions for the parameter observed. Relatively low deviation from E-R for zoo handlers was offset by higher variation in the M-R.

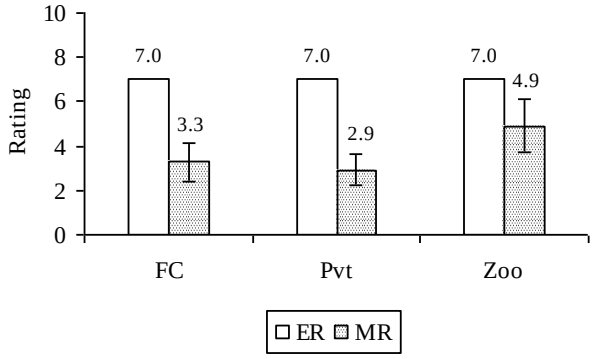


Figure 38a: Comparison of E-R and M-R for handlers' socio-economic profile

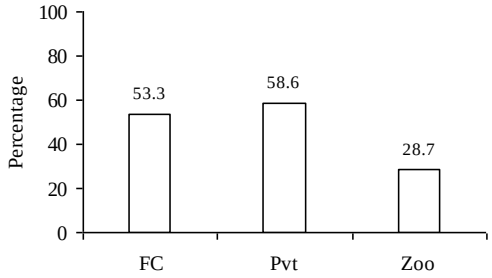
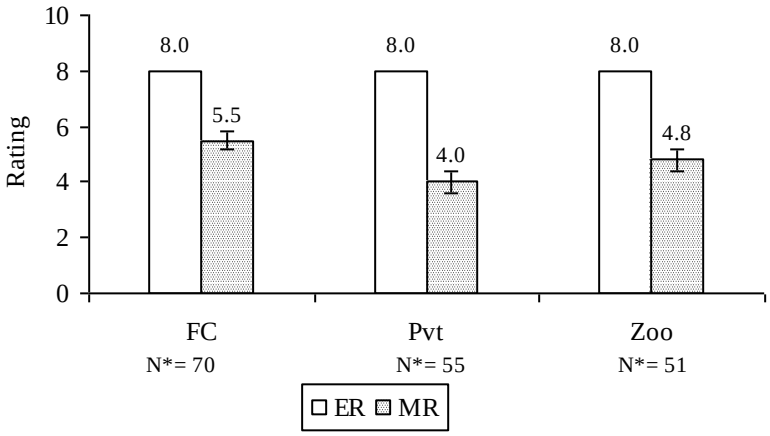


Figure 38b: Percentage wise deviation from E-R for handlers' handlers' socio-economic profile

Overall welfare Status

Welfare status of elephants in captivity maintained by different keeping systems was assessed by looking at the deviation from wild conditions and rating this deviation. Figures 39 and 40 show comparative ratings and distribution of deviation classes across regimes, respectively.



N*: refers to number of observed sub-parameters

Figure 39: Comparison of overall rating across regimes

Privately owned elephants showed lower occurrence of minimum deviation (0-10%) from E-R with FCs showing relatively higher occurrence of minimum deviation from E-R. Conversely, higher occurrence of parameters with deviations of more than 50% from E-R was seen for privately owned elephants (24 parameters) followed by zoo (17) and FCs (14). This implies poorer welfare status for more number of parameters for privately owned elephants. The overall M-R was lowest for privately owned elephants (Figure 40) followed by zoo and FCs.

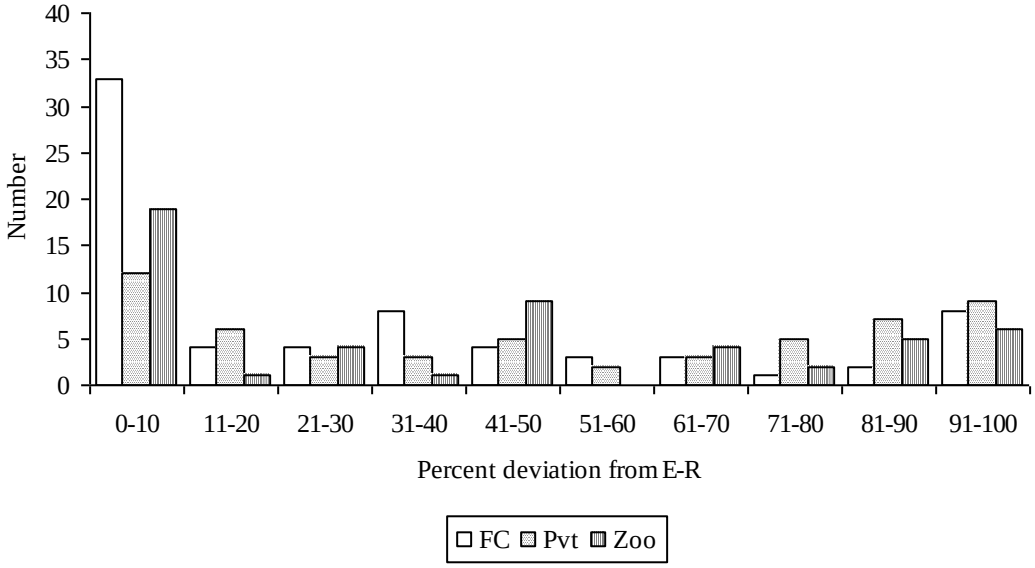


Figure 40: Comparison of Percentage wise deviation classes across regimes

Discussion

Keeping elephants in captivity brings with it the responsibility of providing for their biological and ecological needs. In captivity, these features maybe completely absent or may deviate to various degrees or in kind from what is considered the norm for these animals.

Features which showed poor captive conditions across all regimes:

- Chaining elephants for various durations was observed across all regimes. The impact of this practice on elephants is their inability to access the resources available around them (natural vegetation, space to move) or express species-specific activities. Even when the elephants were allowed to free range, they were hobbled – this practice can be dangerous especially when such elephants are attacked by wild elephants or other wild life as it hinders ease of movement.
- Due to the practice of chaining, the vast physical resource such as occurrence of natural forests, was unavailable for the elephants for the duration of being chained
- The presence of other elephants did not ensure unhindered social interaction due to their work schedule or being tethered to a place
- Males in musth were isolated and chained. This practice is completely at variance with the normal behaviour of sexually mature males in the wild who traverse larger areas (Fernando et al., 2009) as they search for mates.
- The occurrence of abscesses and foot problems was common across regimes. Sarma et al., (2003) reported the occurrence of the same during their pilot project on captive elephant health. The authors also found occurrence of suppurated galls due to use of poorly fitted riding/ logging harness.

Negative features observed for some regimes:

- Zoo elephants did not have access to rivers/ streams; tap or pond water are not ideal as they are either stagnant sources (ponds) or cannot be accessed by the elephants when needed (tap water)
- At night, privately owned and zoo elephants were tethered; this restricts their need to engage in species-typical activities, in a situation of conflict with other elephants in a group, it would be impossible for the elephants to avoid negative interactions
- Both zoo and privately owned elephants were allowed regulated durations of walking. In the wild, elephants forage and are active for most parts of a day. The absence of choice on their need to move, either due to a work schedule or due to administrative decisions, will hamper expression of natural behaviours by the animals
- Zoo elephants were tethered in their enclosure when not working or bringing fodder, leaving the animals with little to perform vis-à-vis their natural behavioural repertoire
- Female elephants (three in number) with private owners had not calved; a fact at variance with the general trend of calf-birth, sired by either captive/ wild males, reported for FC elephants
- Veterinary care for private owner elephants was available only when needed and not on a regular basis; records were not maintained;

A feature of captivity across regimes with impact on the future:
More than half the observed elephants (54%) had been captured or rescued from the wild, comprising of 32 females and 29 males. This would imply removal of genetic stock to this extent from the wild. The success of captive females giving birth (irrespective of male source) is immaterial considering the fate of the new elephants. Sarma, et al., (2003) mention the trade of male elephants from this region to Nepal. 13% (N= 443) male elephants in the state of Kerala were acquired from Assam (Eashwaran, in press). Thus, the genetic resource of the wild is being depleted through capture/ rescue from the wild.

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Section 2:
Captive Elephants in Forest Camps

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).

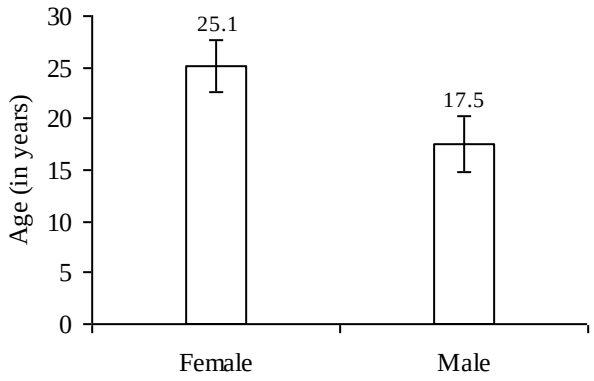
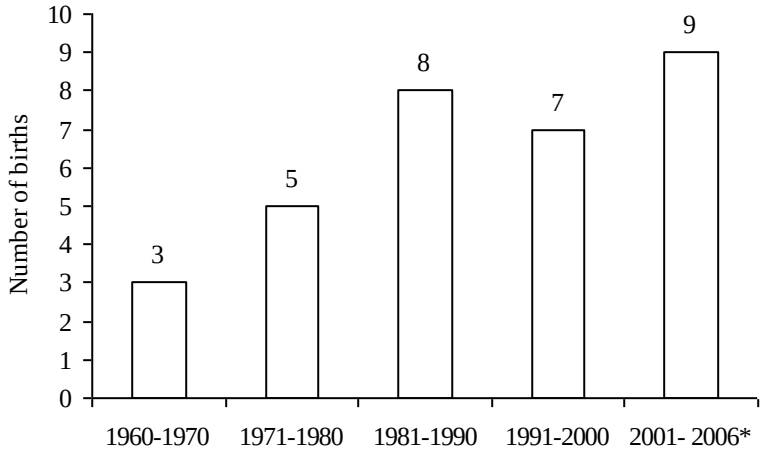


Figure 1: Age-sex distribution of elephants in FCs

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

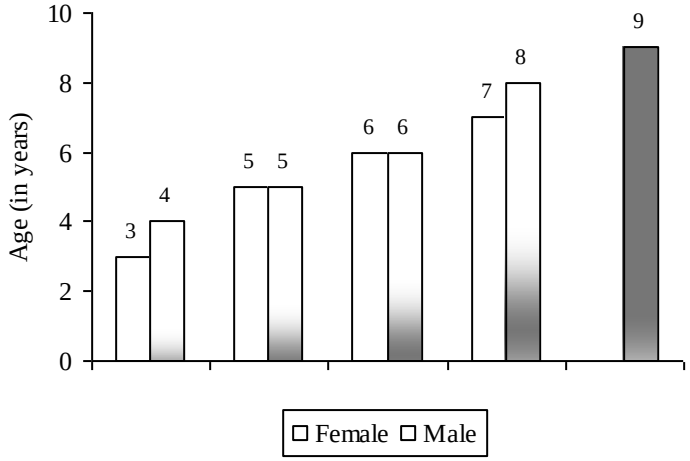


Figure 3: Approximate age at capture for wild-caught FC elephants

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.

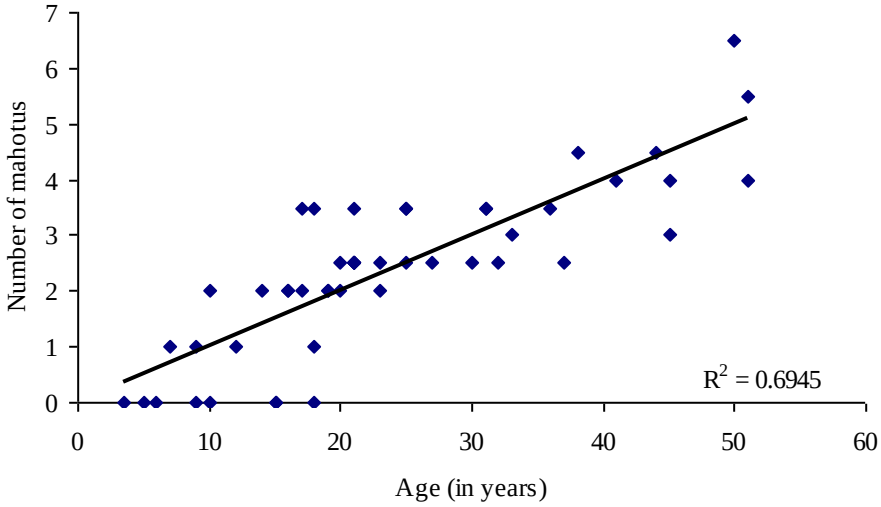


Figure 4: Association between mahout change and age of elephant

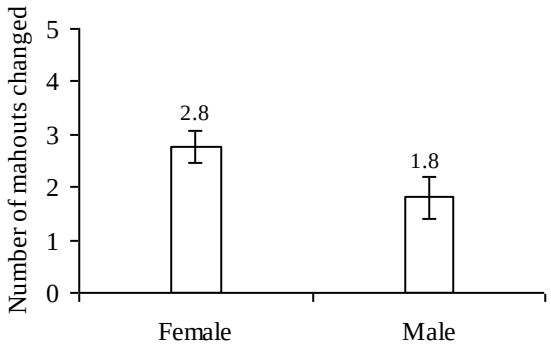


Figure 5: Mean number of mahouts changed based on sex of elephant

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).

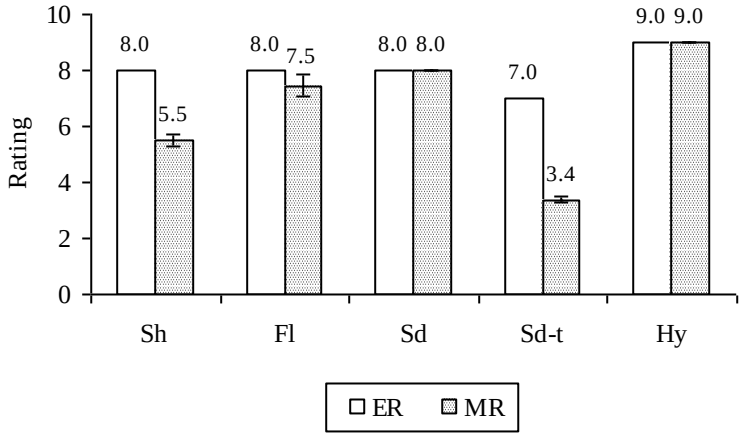
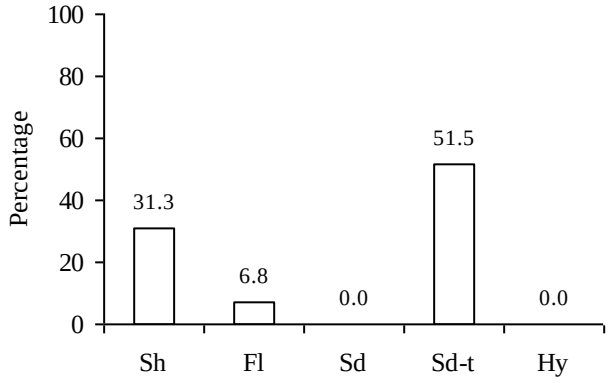


Figure 6a: Comparison of E-R and M-R for 'shelter' sub-parameters



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).

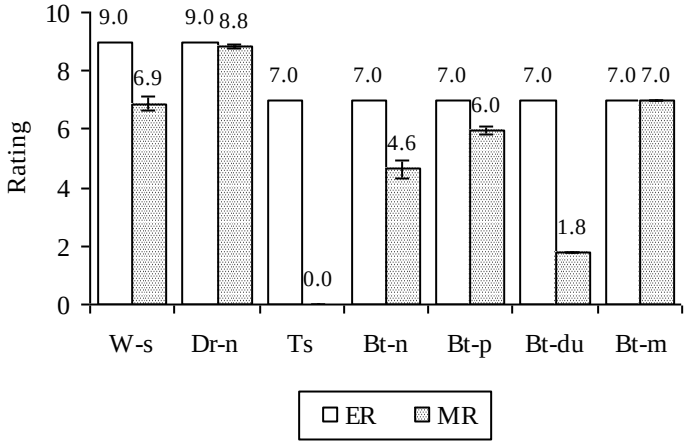
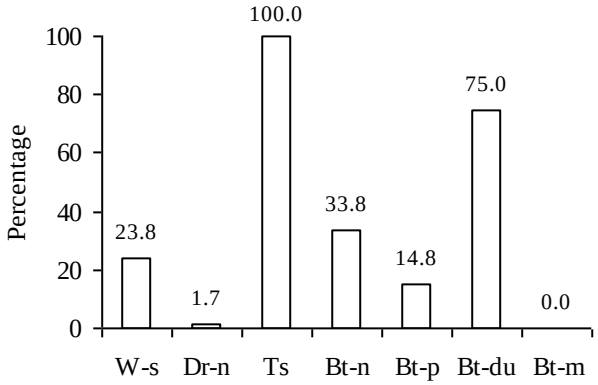


Figure 7a: Comparison of E-R and M-R for 'water' sub-parameters



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 altered their 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).

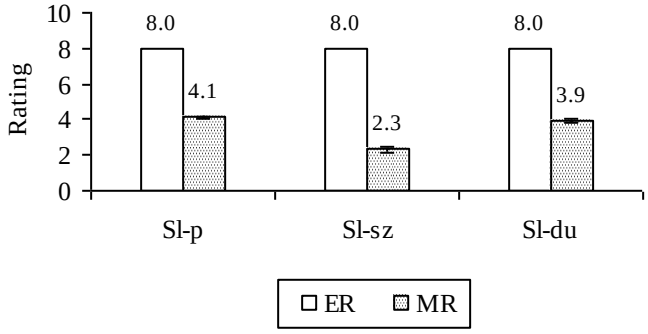
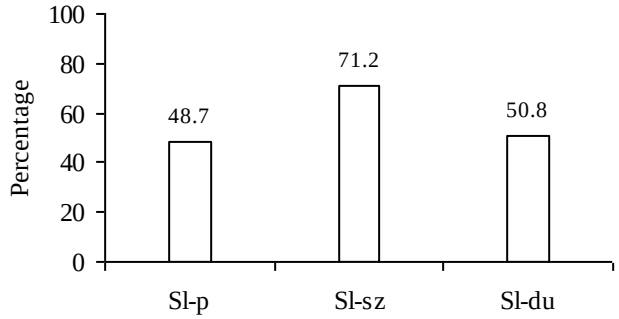


Figure 8a: Comparison of E-R and M-R for 'sleep' sub-parameters



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).

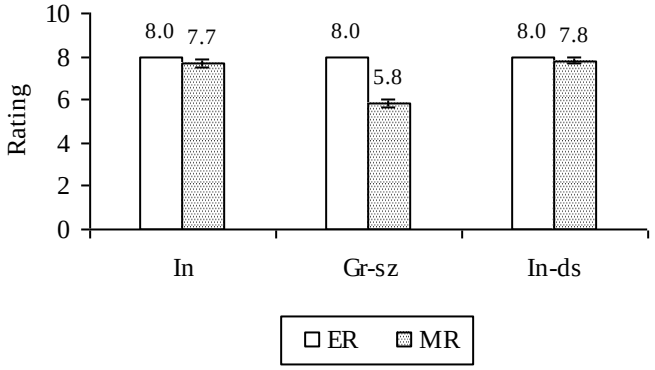
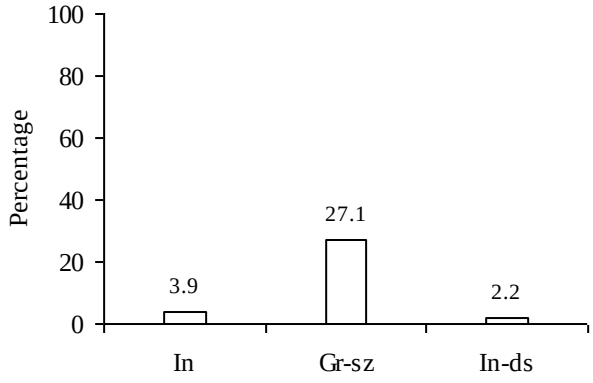


Figure 9a: Comparison of E-R and M-R for 'interaction' sub-parameters



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).

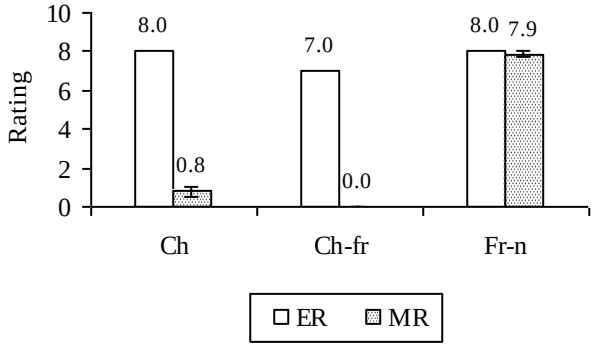
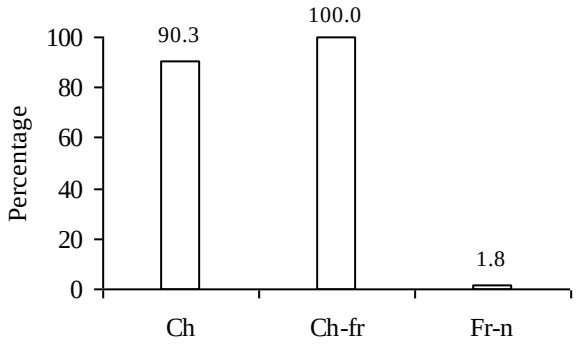


Figure 10a: Comparison of E-R and M-R for 'chain' sub-parameters



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).

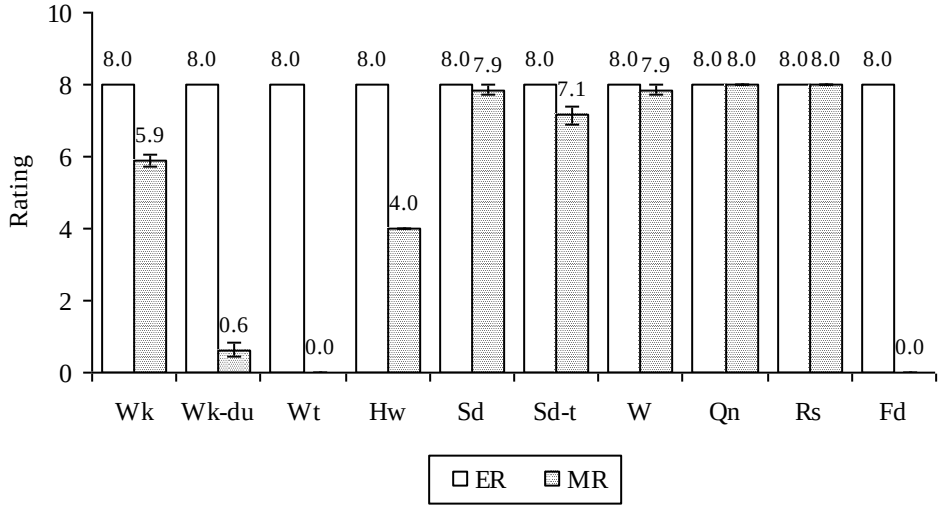


Figure 11a: Comparison of E-R and M-R for 'work' sub-parameters

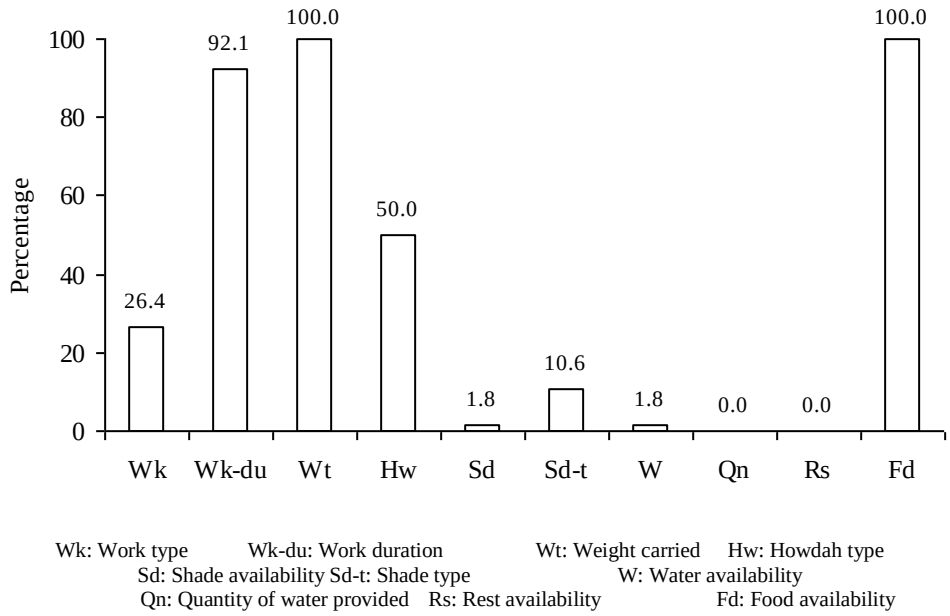


Figure 11b: Percentage wise deviation from E-R for 'work' sub-parameters

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).

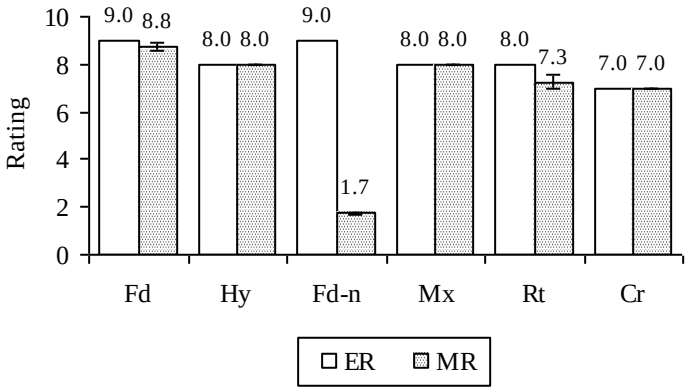
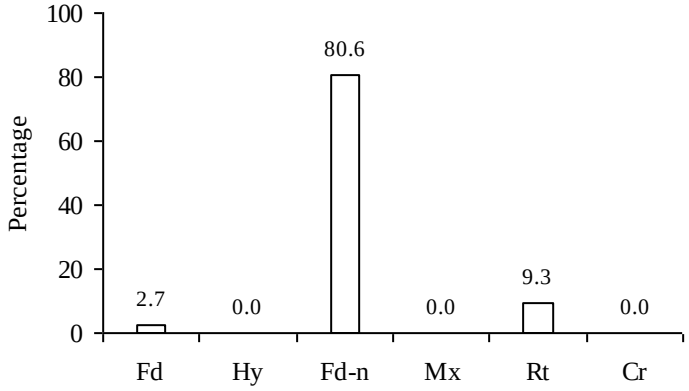


Figure 12a: Comparison of E-R and M-R for 'food' sub-parameters



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).

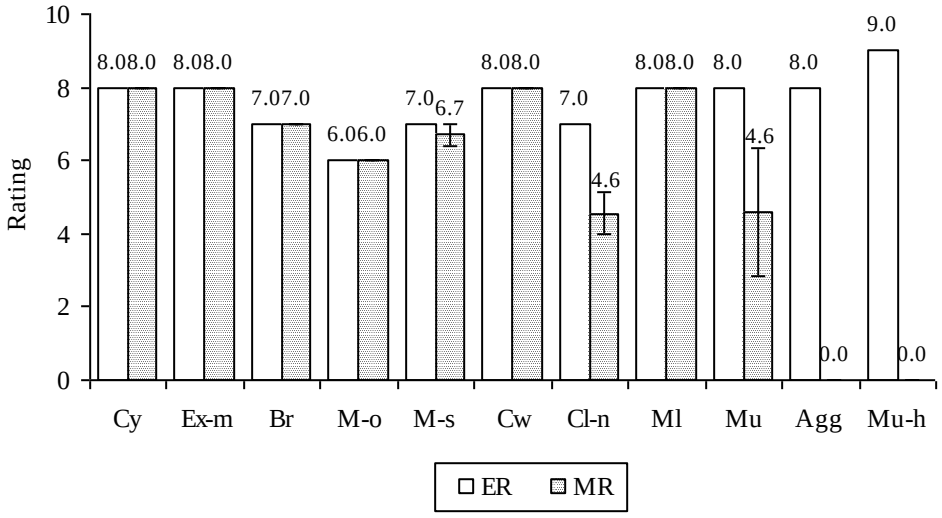
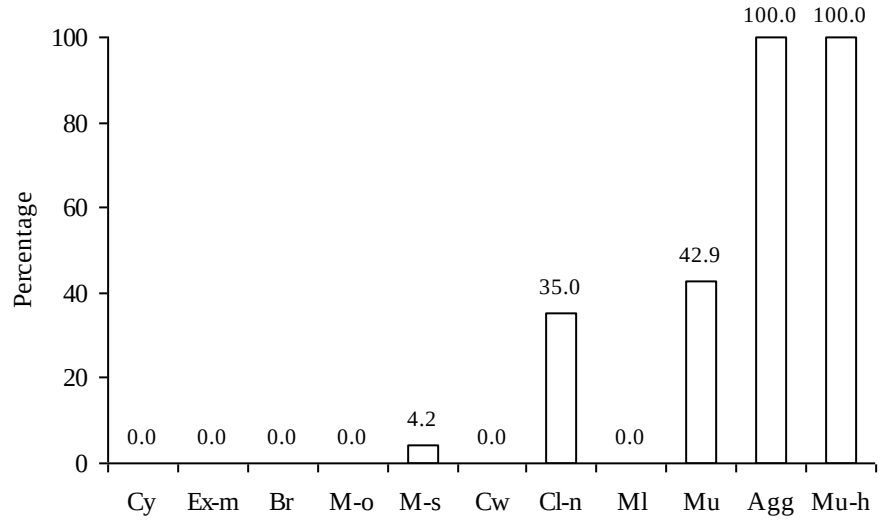


Figure 13a: Comparison of E-R and M-R for 'reproductive status' (male/ female) sub-parameters



Cy: 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).

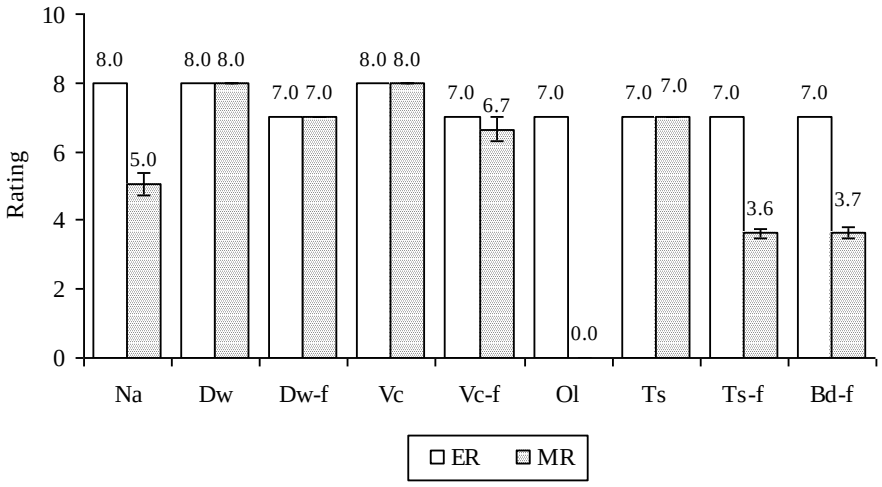
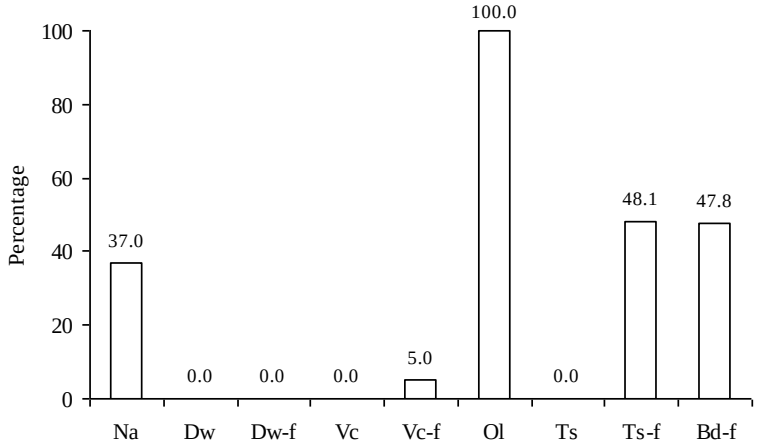


Figure 14a: Comparison of E-R and M-R for health and 'veterinary schedule' sub-parameters



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).

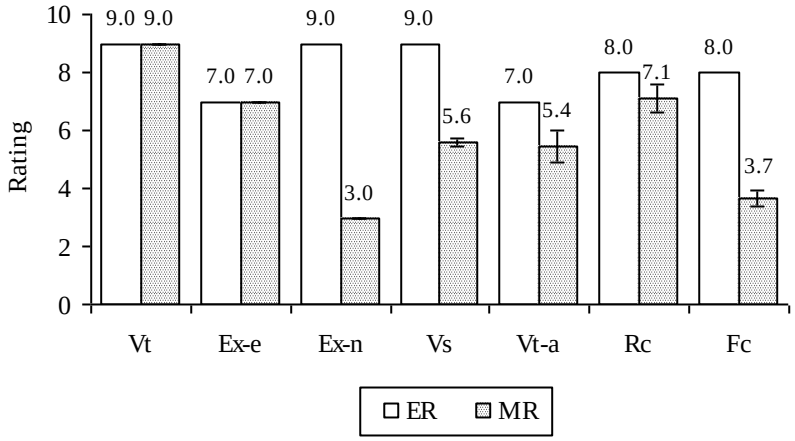
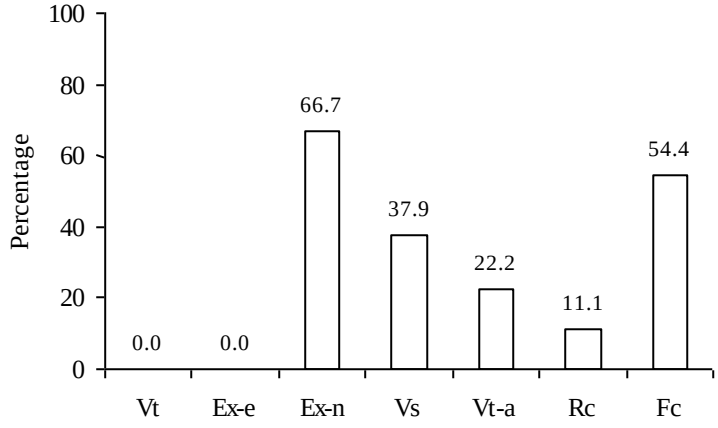


Figure 15a: Comparison of E-R and M-R for ''veterinary personnel and infrastructure'' sub-parameters



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).

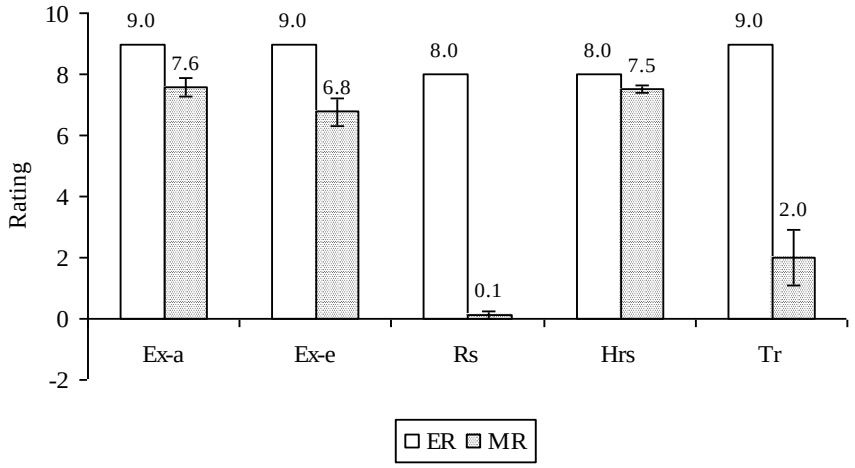
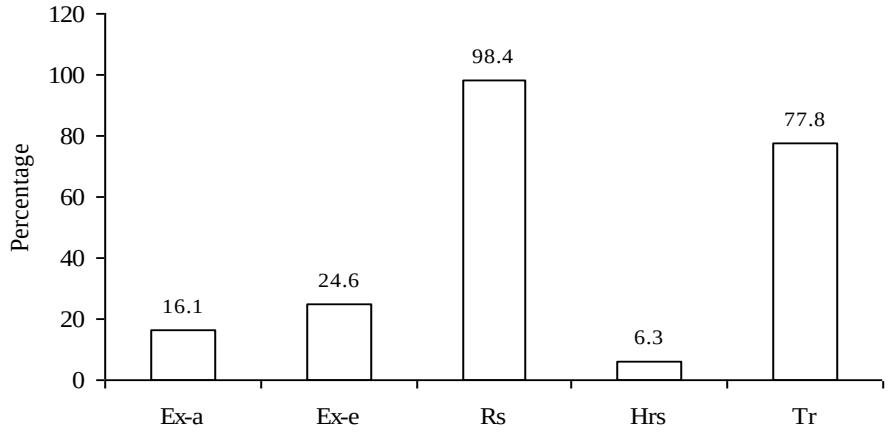


Figure 16a: Comparison of E-R and M-R for handlers' professional experience



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).

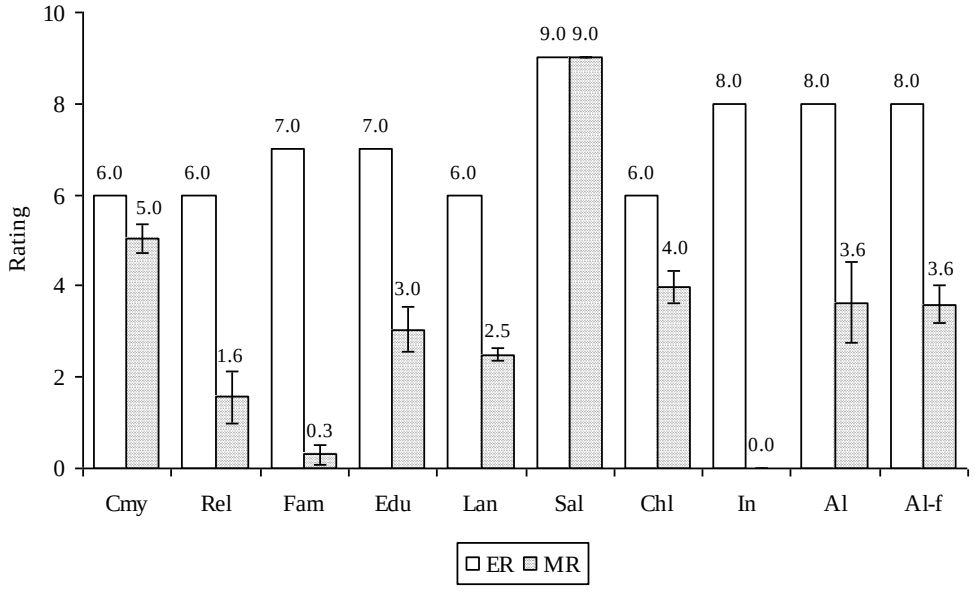


Figure 17a: Percentage wise deviation from E-R for handlers' socio-economic status

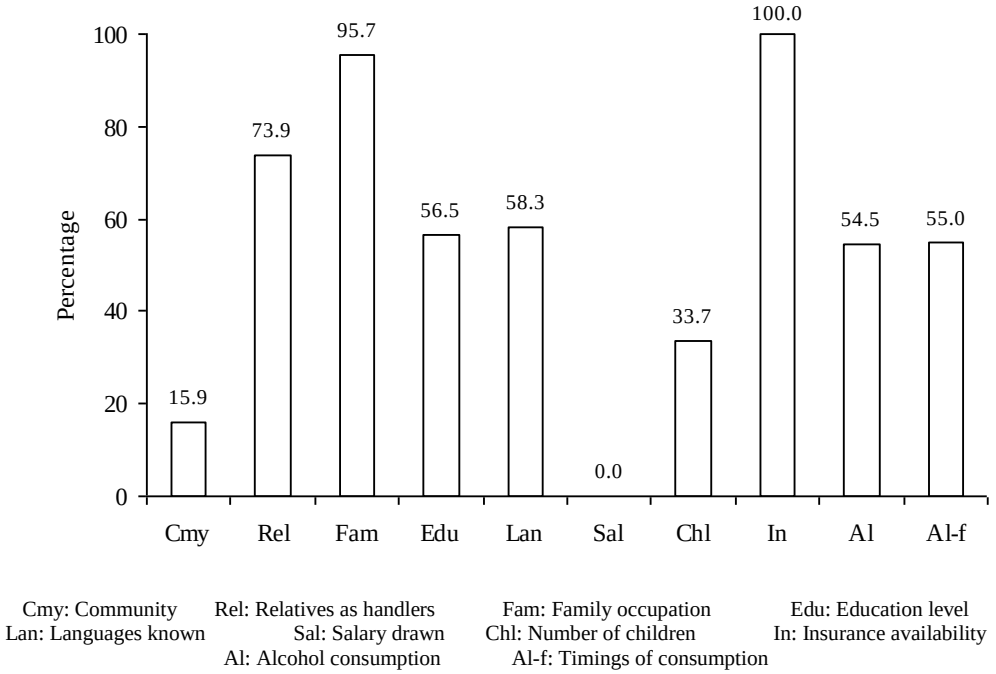


Figure 17b: Percentage wise deviation from E-R for handlers' socio-economic status

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.

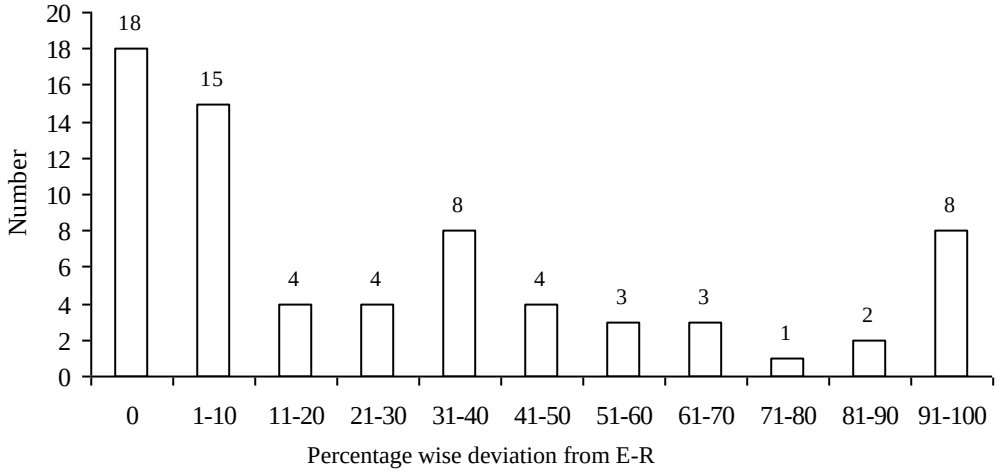


Figure 18: Distribution of Percentage wise deviation from E-R

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 3:
Captive elephants in Zoos

Executive Summary

The zoo cum botanical garden in Guwahati, Assam was established in mid 20th century over a 1.75 sq km area. It houses a variety of indigenous and exotic animals. It houses elephants which have all been rescued from the wild.

This investigation assesses the welfare status of captive elephants and handlers in the zoo by evaluating the physical, social, physiological features of the elephants along with provision for veterinary care and the professional experience and socio-economic status of handlers.

The welfare status of captive elephants has been assessed by comparing physical/ physiological/ social and psychological features in captivity with those observed in the wild. Deviations from wild conditions have been considered to represent poor welfare. Greater the deviation, poorer the welfare. Deviation from the wild state for the parameters observed was rated using a scale developed by elephant experts.

Assam zoo maintained nine elephants, of which six were males and three females. All the elephants in the zoo were rescued from the wild. Mean Rating (M-R) was 3.0 implying a deviation of 50% from Expert Rating (E-R).

All the elephants were used for display and some for providing rides to tourists and the M-R was 3.0 with a deviation of 62.5% from E-R.

The elephants were housed in enclosures with earthen flooring and a forest of limited area was adjacent to the enclosure. M-R was 5.9 implying an overall deviation of 26.7% from E-R.

Tap water and a pond were the source of water; tap water was in the *Pilkhana.* Pond, at a distance of 500 m, was used as a bathing source and the pond was described as "unhygienic". M-R was 3.4 indicating an overall deviation of 50.9% from E-R.

Ability to choose when and where to sleep may be absent/restricted for captive elephants due to the control exercised by people. Tethering elephants at night will cause difficulties in movement while sleeping and may result in long-term health problems as a consequence of ill-suited sleeping positions/ poor substrates.

The elephants were made to walk within the zoo premises for varying durations ranging from 1.5- 2.5 hrs/day for a distance of 3 km. M-R was 2.3 with a deviation of 70.8% from E-R.

All the elephants had opportunity for interaction and the group consisted of individuals whose mean age was only 9.7 yrs. M-R was 4.3 showing a deviation of 46.7% from E-R.

All the elephants were chained with a plain type of chain and the elephants were tethered by a loose chain to the trunk of a tree in the enclosure. M-R was 0.0 with 100% deviation from E-R.

Male and female elephants above 12 yrs were used for work and work involved providing rides for tourists and carrying fodder. *Gaddi & Gaddeli* (60-90 Kg) were used as cushion while carrying tourists (two per trip). M-R for work type was 4.5, for work duration M-R was 4.0 showing a deviation of 43.8 and 50% respectively from E-R.

Except for a physically handicapped 6 yrs old female elephant, all others were allowed limited duration of grazing. Free-ranging was either daily during break from duties or else 2 hours a day for three days a week on a rotational basis. Stall feed was Banyan (Ficus sp.) stems, carrot (*Daucus carota*), wheat (*Triticum* sp.), rice (*Oryza*), garlic (*Allium sativum*) ration, sugarcane (*Sachraum* sp.), Banana (*Musa* sp.) stem, Dol grass, Para grass, Pulses (1-2 kg). M-R was 5.3 showing a deviation of 33.8% from E-R.

Reproductive activity of the elephants was not known. Abscesses, stomach related problems, parasites, lacerated wounds were reported. All elephants were de-wormed once in 6 months, immunised annually against Foot and Mouth disease, Hemorrhagic Septicemia, Anthrax and Rabies. M-R was 6.2 indicating a deviation of 11.3% from E-R.

All elephants had access to two veterinary doctors with 25 and 15 yrs experience respectively in treating elephants. The doctors were said to visit the zoo everyday. M-R was 7.1 implying a deviation of 10.7% from E-R.

Mean age of handlers was 34.6 yrs (ranging from 29 to 37 yrs) and experience in this profession ranged from 12- 34 yrs. M-R was 5.6 with a deviation of 37.7% from E-R. All handlers belonged to the tribal/muslim community, education ranged from class 9th to Pre-University level. M-R was 5.0 implying a deviation of 28.7% from E-R.

Overall mean rating for the elephants, considering all the observed parameters, was 4.8 indicating a deviation of 40.3% from the experts' rating. That is, on an average, the deviation was 40% from standards considered suitable for elephants.

Introduction

The zoo cum botanical garden in Guwahati, Assam was established in mid 20th century over a 1.75 sq km area. It houses a variety of indigenous and exotic animals. One among the zoo's aims of conservation is a means of providing rehabilitation for wildlife. It houses elephants which have all been rescued from the wild.

Objective

Existing conditions of captivity may/ may not be suitable for the elephants in that location. Handlers (mahouts/ assistants) also form an integral part of a captive elephant situation. Hence, this study aims to:

- Assess the welfare status of captive elephants in the zoo by evaluating the physical, social, physiological features of the elephants along with provision for veterinary care
- Assess the professional experience and socio-economic status of handlers

Method

Poole and Granli (2009) suggest provision for biologically relevant mental stimulation and physical activity as a way of meeting the biological and behavioural needs of captive elephants. The default environment for elephants, i.e., the wild has shaped elephant needs, an environment in which the need for expansive physical space and complex social interactions have been shaped. Keeping elephants in captivity in alien conditions, with control on day-to-day routines being exercised by people and not by elephants themselves, will have an effect on the welfare of these animals. The welfare status of captive elephants has been assessed by comparing physical/ physiological/ social and psychological features in captivity with those observed in the wild. Deviations from wild conditions 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.

Data Processing

The rating method

A team of 31 experts including elephant biologists, veterinary doctors (studying wildlife disease and captive elephant disease), welfare personnel (working on wildlife conservation and welfare issues), wildlife managers (managing wild, captive elephants) and elephant mahouts rated different parameters of importance to the welfare of captive elephants (Varma, 2008; Varma, et al., 2008; Varma and Prasad, 2008). This rating was then used to assess the welfare status of elephants and elephant keepers:

- Experts rated a total of 114 welfare parameters covering all the major aspects of captivity
- The rating scale was from zero (unsuitable conditions) to ten (suitable conditions). With this logic, experts used maxima based on their concept of the importance of a particular parameter to an elephant. For example mean expert rating of 8.0 (SE= 0.5, N=29) for a parameter 'floor' and 9.0 (SE=0.4, N=31) for 'source of water' was arrived at from the ratings suggested by each expert

- A mean rating for each parameter, across all the participating experts, has been used as the Experts' Rating (E-R) which represents the importance attached to a parameter.
- For example, if an elephant is exposed only to natural flooring, the animal receives a rating of 8 and for entirely unnatural flooring the value is 0; if animal is exposed to both natural and unnatural flooring, the value is 4 (as 8+0/2= 8/2= 4). If an elephant is exposed to a natural water source, such as a river, it receives a value of 9; if the source of water is large lakes or reservoirs, it gets 4.5. A value of 3.5 is assigned for small water bodies like tanks and ponds. Tap water (running) gets 2.5 and if only buckets, pots, and tankers are in use, then the allocated value is 0.5.
- Data for an elephant or a group of animals was collected. With this data Mean Rating (M-R) was calculated for a given parameter, along with its sub-parameters. Thus the Mean Rating (M-R) denotes welfare status of existing conditions on the ground for the particular parameter.
- In this investigation, variables which represent a common feature of the captive situation 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 zoos here represent the average across related parameters observed for that zoo. For instance, E-R / M-R for a parameter "shelter" represent the average of related parameters (termed sub-parameters) such as type, flooring, size, and shade availability. Not all related parameters will be rated for each of the zoos. The number of such related parameters varies for each zoo.
- Results have been presented comparing E-R and M-R as a means of comparing the extent of deviation present in the parameters observed. The difference between E-R and M-R (expressed as percent) indicates deviation from the prescribed norm.
- For handlers, the difference between the maxima provided by experts (E-R) and existing status (M-R) has been used to indicate the professional/ socio-economic status of value to the handler and his elephant.

Result

Assam zoo maintained nine elephants, of which six were males and three females. Figure-1 gives mean ages of males and females. Female age ranged from 5.4 – 19 yrs while male age ranged from 5.2 – 14.1 yrs.

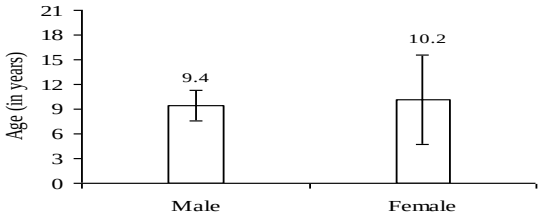


Figure 1: Mean age of male and female elephants

Source
Transfer of elephants from a wild environment to captive conditions involves exposure to a number of human controlled features. This change of environment will be stressful.

- All the elephants in the zoo were rescued from the wild
- Age at rescue ranged from week/ month old calf to an eight year old male
- Most elephants (six of the eight for which data was available) were less than four years old when rescued

M-R was 3.0 (SE= 0.0, N= 9) implying a deviation of 50% from E-R.

Purpose of keeping
Keeping elephants in semi-natural conditions without commercial interest has been given high rating.

- All the elephants were used for display
- Some for providing rides for tourists

M-R was 3.0 (SE= 0.0, N= 7) with a deviation of 62.5% from E-R.

Shelter
The physical space provided for elephants is an important determinant of welfare as wild elephants are known to traverse vast distances across varied terrain (Poole and Granli, 2009), their home range size may range from 100 to 300 sq km (Sukumar, 2003).

- The elephants were housed in enclosures with earthen flooring
- A forest of limited area was adjacent to the enclosure
- Shade was available in the form of trees
- The enclosure was cleaned twice daily but hygiene was described as "moderate"

M-R was 5.9 (SE= 1.3, N= 7) implying an overall deviation of 26.7% from E-R (2a and 2b).

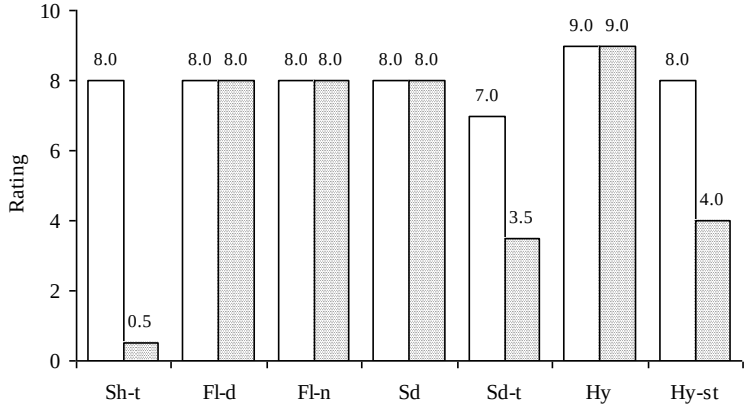


Figure 2a: Comparison of E-R and M-R for 'shelter' sub-parameters

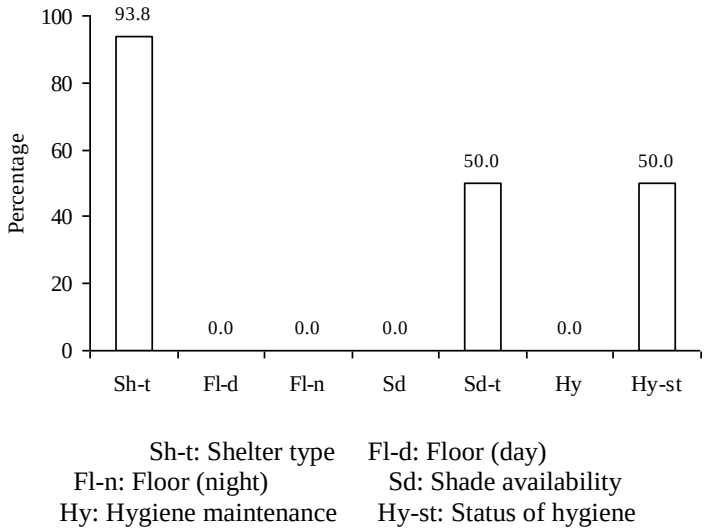


Figure 2b: Percentage wise deviation from E-R for 'shelter' sub-parameters

Water

Access to water for drinking is an important part of wild elephants' range of activity, dust-bathing, wallowing and socialising complementing the range of behaviour (McKay, 1973). In captivity, handlers bathe elephants, hence materials used for scrubbing has also been rated.

- Tap water and a pond was the source of water; tap water was in the *Pilkhana*
- Pond, at a distance of 500 m, was used as a bathing source
- The pond was described as "unhygienic"
- The elephants consumed water 2-4 times/ day; bathing was twice daily in summer and once daily in winter
- Bath duration was 0.5 – 2 hrs; scrub materials were coconut husks, grass and stone

M-R was 3.4 (SE= 1.1, N= 7) indicating an overall deviation of 50.9% from E-R (Figures 3a and 3b).

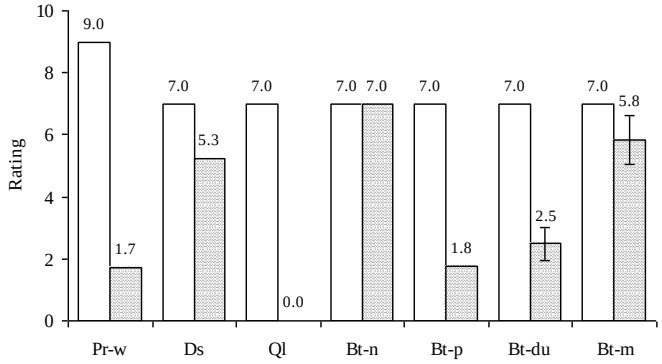
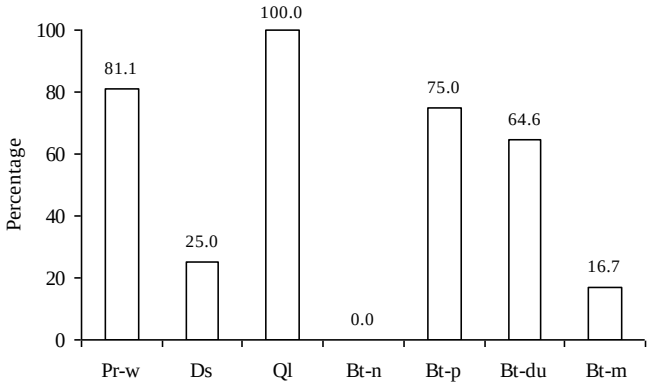


Figure 3a: Comparison of E-R and M-R for 'water' sub-parameters



Pr-w: Perennial source of running water Ds: Distance to water source
Ql: Water quality tests Bt-n: Bathing number of times/day
Bt-p: Bathing place Bt-du: Bath duration
Bt-m: Bathing materials

Figure 3b: Percentage wise deviation from E-R for 'water' sub-parameters

Sleep

Ability to choose when and where to sleep may be absent/restricted for captive elephants due to the control exercised by people. Tethering elephants at night will cause difficulties in movement while sleeping and may result in long-term health problems as a consequence of ill-suited sleeping positions/ poor substrates.

- The enclosure was also the sleeping place for all the elephants
- Hygiene maintenance was moderate in the enclosure

M-R was 3.0 (SE= 0.0, N=8) showing a deviation of 62.5% from E-R for this single parameter.

Walk

A species-typical activity that is also integral to maintenance of foot care is the opportunity provided to walk for captive elephants. Mikota et al., (1994) mention the association between reduced magnitude of walks for elephants in western zoos and the need to provide for foot care.

- The elephants were made to walk within the zoo premises for varying durations ranging from 1.5 to 2.5 hrs/day for a distance of 3 km.
- Time of walk was in the morning or between 2 to 4 p.m.

M-R was 2.3 (SE= 1.6, N= 3) with a deviation of 70.8% from E-R (Figures 4a and 4b).

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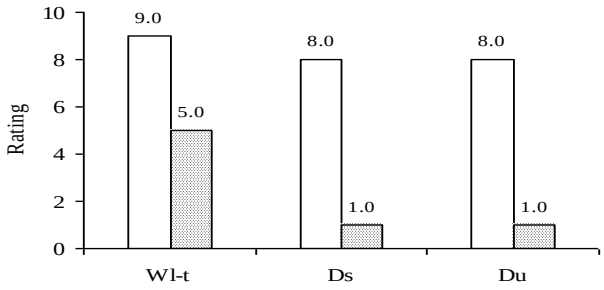
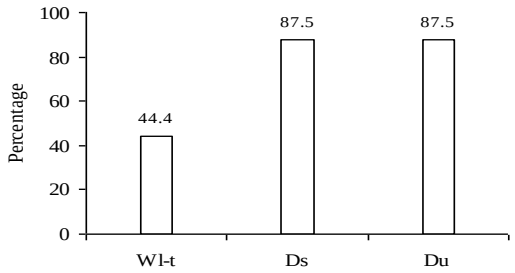


Figure 4a: Comparison of E-R and M-R for 'walk' sub-parameters



Wl-t: Time of walk Ds: Distance covered Du: Walk duration

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

Social interaction

Elephant society has been described as complex (Poole and Taylor, 1999), lasting across generations (Sukumar, 2003). In captivity, even if companions are present, it will be limited in terms of duration or group composition.

- All the elephants had opportunity for interaction
- The group consisted of individuals whose mean age was only 9.7 yrs
- Interaction hours was restricted to 2- 2.5 hrs

M-R was 4.3 (SE= 2.6, N= 3) showing a deviation of 46.7% from E-R (Figures 5a and b).

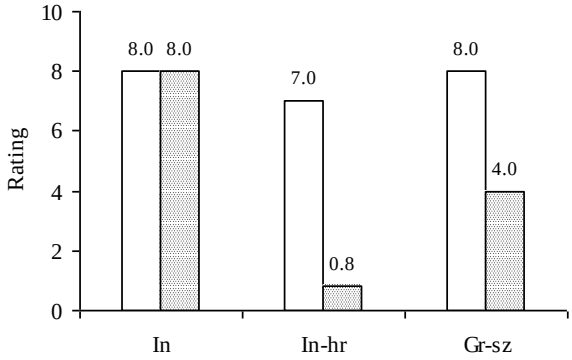
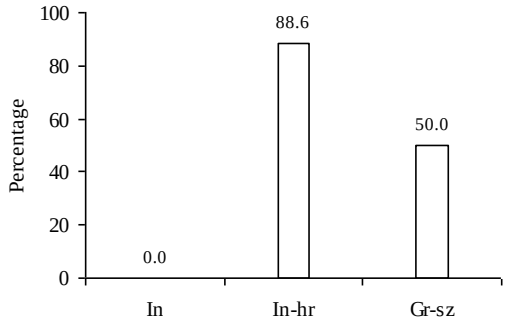


Figure 5a: Comparison of E-R and M-R for 'interaction' sub-parameters



In: Interaction In hr: Interaction hours Gr-sz: Group Size

Figure 5b: Percentage wise deviation from E-R for 'interaction' sub-parameters

Chaining

The practice of chaining captive elephants is widespread as it is considered a way of managing the animals. Restraining elephants' movements will create frustration due to its inability to perform species-typical behaviours. Prolonged duration of a single activity without recourse to move freely may not be suitable for their psychological and physical health.

- All the elephants were chained, with a plain type of chain
- The elephants were tethered by a loose chain to the pole of a tree in the enclosure
- Chains were removed when the elephants were made to walk/ bathed
- The elephants that were left to free range at night were hobbled

M-R was 0.0 (SE= 0.0, N= 4) with 100% deviation from E-R (Figures 6a and 6b).

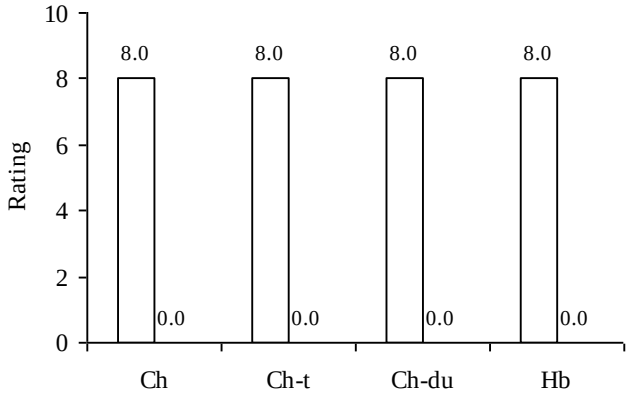
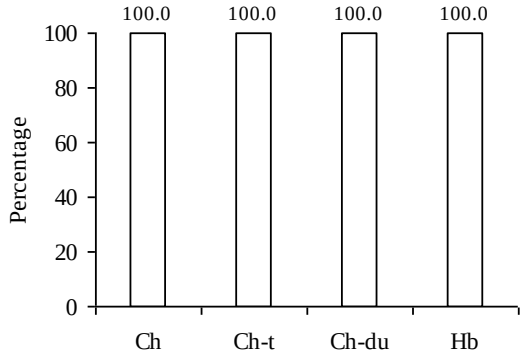


Figure 6a: Comparison of E-R and M-R for 'chaining' sub-parameters



Ch: Chaining status Ch-t: Chain type Ch-du: Chaining duration
Hb: Hobbling of forelegs

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

Observed behaviour
Temperament that enables easy handling of elephants has been given high rating.

- Three of the elephants (all females) were described as quiet/ reliable, one was said to be easily frightened.
- There were no reports of aggression towards people

M-R for temperament was 6.0 (SE= 2.3, N= 4) and for occurrence of aggression/ killing/ injury of people was 9.0 (SE= 0.0, N= 3) showing a deviation of 25% and 0.0% respectively, from E-R.

Work
The kind of work elephants perform/ do not perform is an important indicator of their captive condition. Absence of work and restriction on movement is not conducive to a healthy psychological/ physical constitution.

- Male and female elephants above 12 yrs were used for work
- Work involved providing rides for tourists and carrying fodder
- Duration of work was 1.0 – 1.5hrs, in the afternoon (2.30 to 4.00 p.m.)
- *Gadd* (60 to 90 kg) was used as cushion while carrying tourists (two per trip)

M-R for work type was 4.5 (SE= 1.4, N= 8), for work duration M-R was 4.0 (SE= 0.0, N= 3) showing a deviation of 43.8 and 50% respectively from E-R.

Food
A wide variety of plants are eaten by wild elephants (McKay, 1973; Sukumar, 1991) using different parts of their body to manipulate it before eating it. Hence, captive elephants need to learn both the variety and ways of eating it. This can be done only when opportunity is given to free range.

- Except for a physically handicapped 6 yrs old female elephant, all others were allowed limited duration of grazing
- Free-ranging was either daily during break from duties/2 hours a day, three days a week on a rotational basis
- Feeding area was the *Pilkhana* or the forest area within the zoo, stall feed was given in the afternoon
- Stall feed was Banyan (Ficus sp.) stems, carrot (*Daucus carota*), wheat (*Triticum* sp.), rice (*Oryza*), garlic (*Allium sativum*) ration, sugarcane (*Sachraum* sp.), Banana (*Musa* sp.) stem, Dol grass, Para grass, Pulses (1 to 2 kg)
- Commercial cattle mineral mix was given
- Ration chart was used

M-R was 5.3 (SE= 1.6, N= 5) showing a deviation of 33.8% from E-R (Figures 7a and 7b).

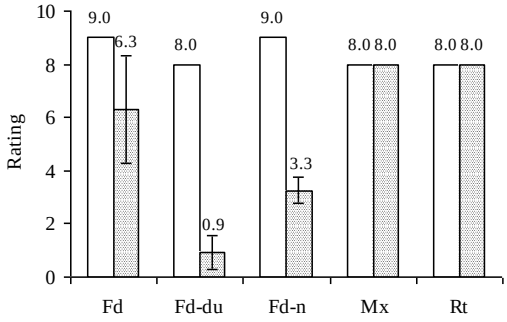
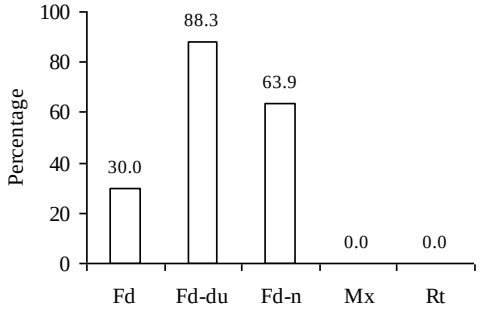


Figure 7a: Comparison of E-R and M-R for 'food' sub-parameters



Fd: Food provisioning type Fd-du: Duration of feeding Fd-n: Number of food items
Mx: Mineral mix given Rt: Usage of ration chart

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

Reproductive status

Reproductive activity of the elephants was not known (for animals above 10 yrs; three males and one female).

Health status

Captive conditions may predispose elephants to a number of health problems such as prevalence of foot problems (Mikota et al., 1994), excessive weight or malnourishment, etc. Veterinary routines practiced to maintain health has been rated along with disease/ injury occurrence.

- Abscesses, stomach related problems, parasites, lacerated wounds were reported
- Abscesses were seen on foreleg and thigh region
- A female 6 yr old elephant was reported to have bilateral femoral fracture leading to radial paralysis. She was also blind in one eye
- All elephants were dewormed once in 6 months, immunized annually against Foot and Mouth disease, Hemorrhagic Septicemia, Anthrax, Rabies
- Oiling was not done for all except for a 5.4 yr old female elephant
- Fecal (faecal) samples tested biannually, blood and urine test was based on necessity

M-R was 6.2 (SE= 0.9, N= 8) indicating a deviation of 11.3% from E-R (Figures 8a and 8b).

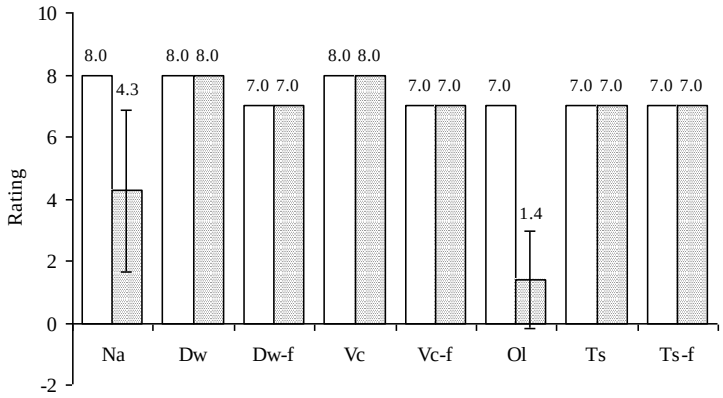
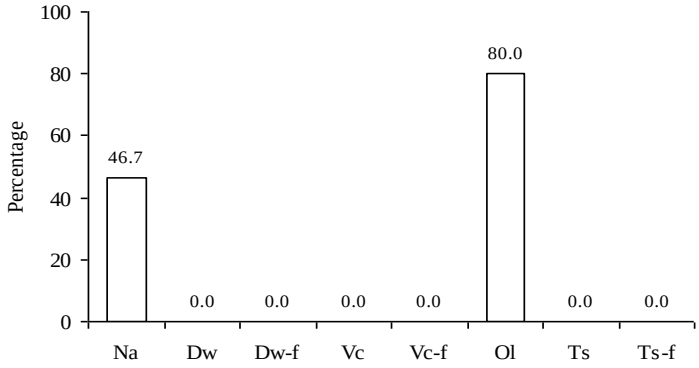


Figure 8a: Comparison of E-R and M-R for 'health' sub-parameters



Na: Nature of disease/ injury Dw: De-worming done Dw-f: Frequency of deworming
Vc: Vaccination done Vc-f: Frequency of vaccination Ol: Oiling done
Ts: Tests of blood/ dung/ urine samples Ts-f: Frequency of sample testing

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

Veterinary personnel and infrastructure

Availability of veterinary personnel of relevant experience and provision of infrastructure is considered to be an important factor in maintaining health.

- All elephants had access to two veterinary doctors with 25 and 15 yrs experience respectively in treating elephants.
- The doctors were said to visit the zoo everyday
- Veterinary assistants were also available
- Staff quarters, cooking shed and vessels, animal stand, camp site, *Pilkhana*, Provision shed, Calf shed, Clinical laboratory, medicine store were available.

M-R was 7.1 (SE= 0.7, N= 7) implying a deviation of 10.7% from E-R (Figures 9a and 9b).

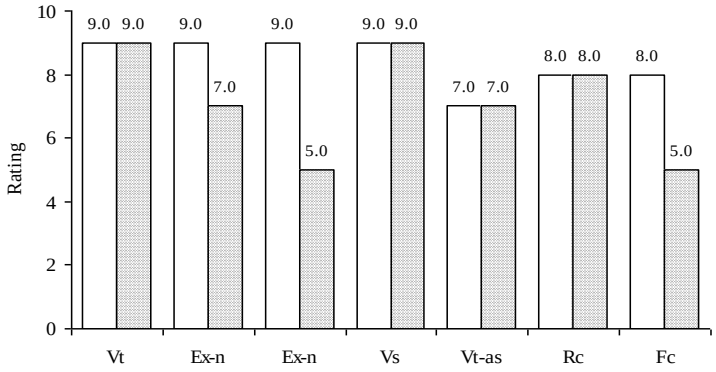
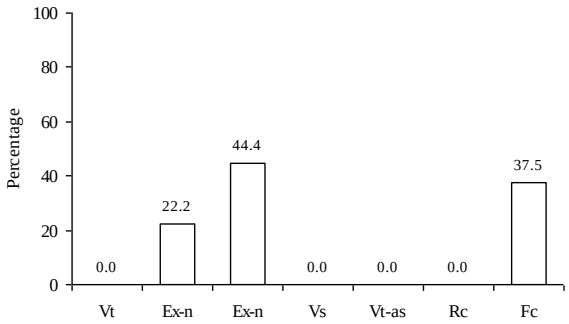


Figure 9a: Comparison of E-R and M-R for 'veterinary personnel' sub-parameters



Vt: availability of veterinary doctor Ex-n: Number of years of experience
Vs: Frequency of visits Vt-as: Veterinary assistant availability
Rc: Maintenance of records Fc: Facilities available

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

Figure-10 gives the amount of deviation Percentage wise, from minimum to maximum, from E-R for all the observed parameters. It can be seen that deviations of 50% or more occurred 22 times (43% of the total).

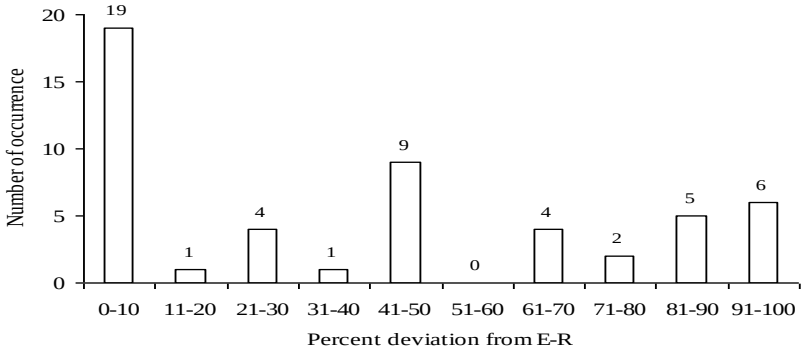


Figure 10: Distribution of Percentage wise deviation from E-R across all parameters

Handler status

Data was available for four mahouts and one assistant handler. Mean age was 34.6 yrs (ranging from 29 to 37 yrs).

Professional experience

Poor experience in handling elephants can be dangerous to the animal as well as the handler and general public.

- Experience in this profession ranged from 12 to 34 yrs
- Experience with specific zoo elephant ranged from 0.6 to 5 yrs
- All handlers had opted for this profession as a source of employment
- All had good knowledge of use of commands
- Number of hours spent with elephant ranged from 3.5 to 8 hrs
- All handlers used tools, wooden stick/ *Khukri* to control their elephant

M-R was 5.6 (SE= 1.7, N= 5) with a deviation of 37.7% from E-R (Figures 11a and 11b).

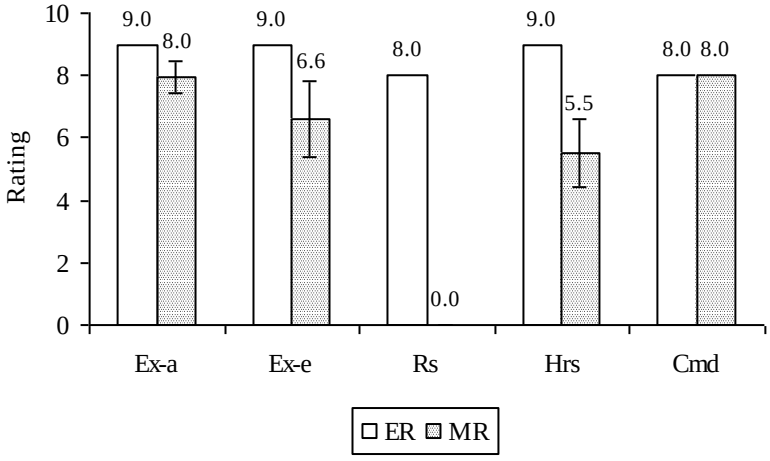
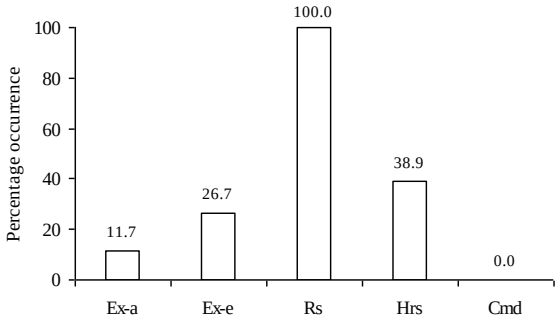


Figure 11a: Comparison of E-R and M-R for 'professional status' sub-parameters



Ex-a: Experience as % of handler age Ex-a: Experience as % of elephant age
Rs: Reason for choosing this profession Hrs: Number of hours spent with elephant

Figure 11b: Percentage wise deviation from E-R for 'professional status' sub-parameters

Socio-economic status

Prevalence of satisfactory socio-economic conditions in terms of sufficient remuneration, insurance availability, abstinence from alcohol, education at least up to the 10th class, a family occupation dealing with elephants, small family size, etc could help in providing an overall satisfactory status for the handlers which could be reflected in better handling of elephants.

- All handlers belonged to the tribal/ muslim community
- Education ranged from 9th class to Pre-University level
- Salary drawn ranged from Rs.84,000 to Rs. 95,000/- annually
- Number of children per family ranged from none to two
- Languages known varied from 1 to 2
- Insurance cover was not available
- Of the interviewed handlers, two did not consume alcohol, while one consumed occasionally after work

M-R was 5.0 (SE= 1.2, N= 7) implying a deviation of 28.7% from E-R (Figures 12a and b).

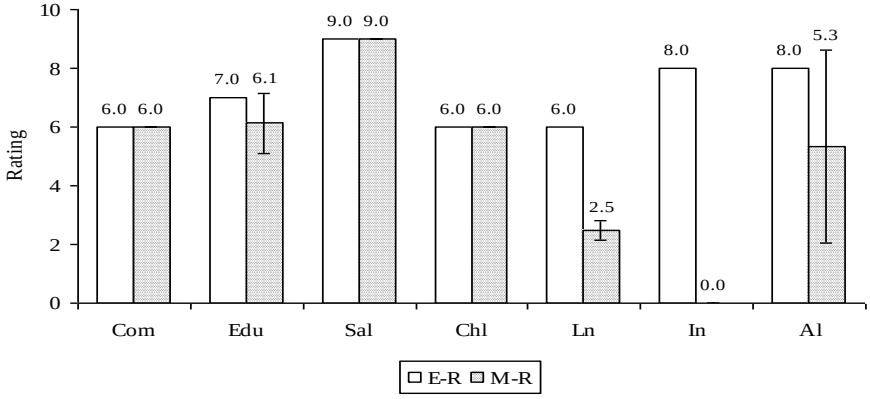
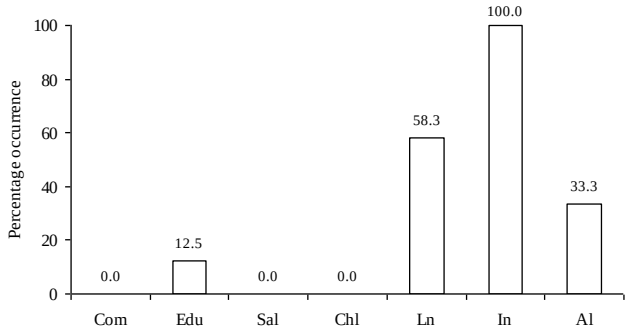


Figure 12a: Comparison of E-R and M-R for 'socio-economic status' sub-parameters



Com: Community Edu: Education level Sal: Salary drawn
Chl: Number of children Ln: Languages known In: Insurance availability Al: Alcohol consumption

Figure 12b: Percentage wise deviation from E-R for 'socio-economic status' sub-parameters

Overall mean rating for the elephants, considering all the observed parameters, was 4.8 (SE= 0.4, N= 51) indicating a deviation of 40.3% from the experts' rating. That is, on an average, the deviation was 40% from standards considered suitable for elephants

Discussion

Captive elephants are dependent on their human benefactors for most of their day to day activities (Bradsahw, 2009). Irrespective of where the elephant is kept, control by the elephant is limited by management decisions. This has consequences for the elephants in terms of the difference in their living conditions (biological and physical) from those experienced by their wild counterparts. It is this difference that has been rated as an indicator of the welfare status of captive elephants in this zoo.

The amount of deviation percentage wise (from minimum to maximum), from E-R for all the observed parameters show that deviations of 50% or more occurred 22 times (43% of the total).

Parameters that showed no deviation from E-R:

1. Performance of veterinary routines such as de-worming/ immunisation/ sample testing
2. Availability of veterinary personnel of relevant experience

The parameters assessed for welfare included presence-absence types which can only be rated in the two extremes. Such parameters constituted 33% of all the observed parameters. Occurrence of maximum possible rating for such parameters was contributed by health and veterinary personnel (accounting for 6 of the 13 such ratings), 11.8% of all the observed features. That is, nearly 12% of the overall mean rating will contain maximum possible rating for that parameter, contributed by health and veterinary parameters.

Since performance of veterinary routines and availability of veterinary personnel/ infrastructure are common to all the animals in the zoo, the existing welfare rating exclusive to these two parameters may give a precise picture of the status of elephants in the zoo.

When these two parameters are excluded, the overall mean rating was 4.0 (SE= 3.0, N= 37) showing a deviation of 49.9% from E-R.

Parameters showing less than 10% deviation:

1. Shelter: provision of an open enclosure with natural substrate and availability of trees was considered suitable for the elephants. This was however, offset by restraining the elephants for most parts of the day by chaining. Consequently, even though flooring was natural, accumulation of excreta in the tethering place led to poor hygiene maintenance and potential source of disease/injury for the elephants.

Parameters showing >50% deviations:
Shelter type, water, food, work and behaviour:

a. The zoo had access to a natural vegetated region of limited space. This was negated by the practice of chaining the elephants in the morning and whenever the animals were not free-ranging. Hence, related features such as walking and opportunity to forage in semi-natural conditions were limited at best. Both these activities constitute nearly 12-18 hrs of the elephant's daily pattern, depending on food and water availability (Sukumar, 2006). Thus, a major difference in the captive elephants living conditions was observed.
b. The zoo did not have access to perennial source of running water that can reduce contamination. The available bathing source was described as being unhygienic. Drinking water was not accessible to the elephant when needed as the source was tap water.
c. Use of elephants for work of 1-2 hrs followed by chaining and provision of food is not a healthy practice as it leads to insufficient psychological and physical exercise resulting in negative consequences.
d. Limited interaction such as feeling, touching, and playing opportunities among the elephants were observed. Considering the complex and long-lasting interactions in elephant society and their 'group living' nature, the absence of the same even when an opportunity exists for its expression is a major negative feature.
e. Foot related problems were observed for three of the young elephants, with one said to be permanently physically disabled. The occurrence of foot problems in young elephants is a cause for concern.
f. Source of elephants: the age structure of the elephants was less than 10yrs with a single adult female. All the elephants were rescued from the wild. Two aspects can be gleaned from this fact (i) none were captive born (ii) the existing elephant population in the zoo was relatively new. There is no information on the status of elephants prior to this. This leads to a need for a policy for the zoo: the management has to decide whether it wants to continue to rescue and rehabilitate the elephants. If so, release into the wild has to be an option and consequent protocols for proper release of the orphaned/ rescued elephants have to be formulated.

Handler status

The salary paid to handlers was considered to be sufficient; however, there was no provision for insurance cover. All handlers used tools to control their elephant, a practice that may have negative consequences for the elephant.

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Section 4:
Captive Elephants under Private Ownership

Executive Summary

During the British period, capture of wild elephants, for use in the Government service, ensured that licenses were granted to individuals for providing elephants of certain measurements to the Department. This led to the practice of maintaining elephants by individuals and they continue keeping elephants to this day in Assam.

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 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

A total of thirty-one elephants were observed, belonging to different individual owners across Assam. Female elephants accounted for 65% of the observed elephants; age ranged from 5-55 years, and that of males from 22-44 years.

Eighty six percent of the elephants had been captured from the wild; only two elephants were captive born and two elephants had been purchased. M-R was 0.6 implying a deviation of 90% from E-R.

All elephants were working animals: logging/ for use in tourism/ as *koonkie*; only one owner kept his elephant partly as a family tradition and also for use in logging operations. M-R was 3 with a deviation of 68% from E-R.

The elephants were kept in the open, tethered to a tree when not working and the shade was available in the form of trees. M-R for shelter was 0.0 showing a deviation of 94% from E-R.

Water source for the elephants was varied: ponds/ taps/ river/ stream, but all elephants had access to rivers/ streams. River/ stream as the only source, accounted for 38% of all the elephants. Summer bath frequency was twice per day, in winter the elephants were bathed once; Bath duration ranged from 1- 1.5h; scrub materials used was *shau*, hay, coconut husk and stone. M-R was 5 indicating an overall deviation of 37% from E-R.

All the elephants had opportunity for interaction either in the camp or in the forest with wild elephants, or in the work place. Hours of interaction ranged from 1-24 hrs; mean number of individuals per group was 3, ranging from 1-5. M-R was 5 showing a deviation of 34% from E-R.

All the elephants were chained; chain weight ranged from 25-50 kg, size from 0.6-15cms and length from 15-50m. Eighty percent of the elephants were allowed to free range at night. The elephants that were left to range free at night were hobbled/ tied with drag chain; anchor chain was used for two elephants. M-R was 3 with 60% deviation from E-R.

Sixty seven percent of the elephants were described as quiet/ reliable; two female elephants aggressive. None of the elephants exhibited stereotypy; however, 33% of the elephants had run amok. M-R was 5 showing a deviation of 42% from E-R.

Fifty five percent of elephants were used for logging related work only, 24% in logging as well as *Koonkie*; only two elephants were used in tourism/ festivals/ in patrolling in addition to logging. Elephants took part in religious processions/ in inaugural functions of business establishments. M-R was 5 showing a deviation of 40% from E-R.

Ninety three percent of the elephants were allowed to graze/ browse and provided stall feed. Stall feed included various combinations of Horse gram (*Macrotyloma uniflorum*), Banyan stem (*Ficus*), Para grass (*Urochloa mutica*), Rice (milled grains of *Oryza sativa* along with banyan, Banyan leaves along with grams, Boiled paddy, a boiled mixture of rice, grams and soybean (*Glycine max*), mixture of rice, ghee and grams. M-R was 3 showing a deviation of 62% from E-R.

Data was available for five female elephants on the status of female reproductive status. Occurrence of oestrus was recorded for one. Three were exposed to males; one female exposed to wild males also. None of the females had calved. M-R was 3 with a deviation of 54% from E-R.

One adult male was not reproductively active; this male and another had not sired offspring. All elephants were reported to exhibit musth. All elephants, except one, were aggressive/ unpredictable during musth; two elephants had killed during this period. Musth elephants were isolated, chained and watered, feed was reduced. M-R was 3 with a deviation of 62.5% from E-R.

Occurrence of gastro-intestinal disorders, parasites, abscesses, lameness, toe nail cracks, anemia was reported; left foreleg was fractured for an adult female. A 46y old female was suspected to have contracted Tuberculosis and was undergoing treatment. M-R was 5 with a deviation of 43% from E-R.

All observed elephants had access to a veterinary doctor; experience with elephants ranged from 5 – 20 years. Frequency of visits ranged from "on call" to annually. None of the owners (N = 5) maintained records. M-R was 4 implying a deviation of 49% from E-R.

Mean age of handlers was 35 years, ranging from 22- 46 years. Experience in this profession ranged from 2 months to 32 years, with four of the seven handlers having more than 15y experience. All handlers used tools, *Khukri*, *gupti* (foot-length goad with small metal tip at one end), stick, wooden ankush, and bamboo stick. M-R was 5 with a deviation of 42.7% from E-R.

Salary drawn ranged from Rs.12,000/- to 24,000/- annually and Insurance cover was not available for any of the observed handlers. All, except one, consumed alcohol occasionally/ regularly, after work. M-R was 3 implying a deviation of 59% from E-R.

Overall M-R was 4.0 showing an overall deviation of 50% from E-R. Deviations of 50% or more from E-R accounted for 49% of the occurrences implying nearly half of the observed parameters deviated to this extent from the norms prescribed by experts.

Introduction

During the British period capture of wild elephants for use in the Government service, ensured that licenses were granted to individuals for providing elephants of certain measurements to the Department (Sanderson, 1879). The captured elephants, if not accepted by the British Government, belonged to the licensee. This may have led to the practice of maintaining elephants by individuals. The presence of elephants with private owners has continued to this day in Assam.

Objective

Conditions in captivity may vary across owners, with some or all features being suitable or otherwise to the elephants. This report aims to:

- Assess the welfare status of elephants by considering the physical, social, psychological and reproductive features of captivity
- Assess the veterinary care provided to the elephants
- Handlers are an essential feature of captive elephants' management systems. Hence, their professional experience and socio-economic status has been reviewed.

Method

Elephants in captivity cannot be considered to be domesticated as they have not been bred selectively and new individuals are added by capture from the wild. Hence, their needs can be comparable with the ecological and biological features characteristic of wild elephants. Ferrier (1947) states the need for providing natural conditions in captivity to ensure that the elephants' health is maintained.

The welfare status of captive elephants has been assessed by comparing a range of features in captivity with those the experienced by their counterparts in the wild. The comparison has been made possible by a rating scale developed by a team of experts (from different fields). The greater the deviation from the norms prescribed, the poorer is the welfare. Data on elephants and handlers was obtained through observation and 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 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. 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

A total of thirty-one elephants were observed, belonging to different individual owners across Assam. Female elephants accounted for 65% of the observed elephants (Figure 1); age ranged from 5-55 yrs, and that of males from 22-44 yrs.

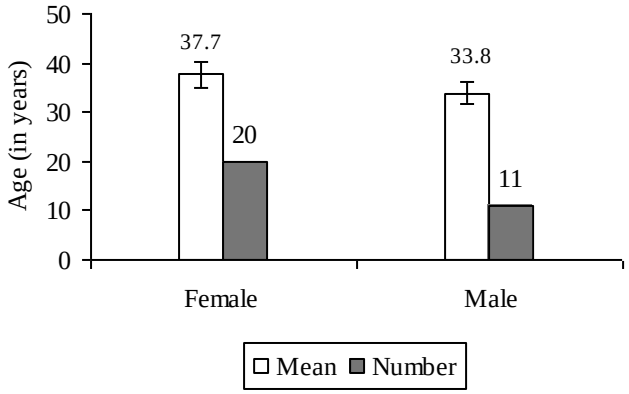


Figure 1: Mean age and numbers of male and female elephants

Source

Elephants undergo a drastic change when they captured from the wild and subjected to captive conditions. Even among captive born elephants, any translocation across locations/ owners will involve a new and unknown environments, leading to an altered lifestyle. This causes stress among the animals and consequent poor welfare.

- 86% of the elephants (N= 28) had been captured from the wild; Figure 2 shows the numbers caught from 1950 to 1990 (this represents the numbers caught and presently owned by private owners)

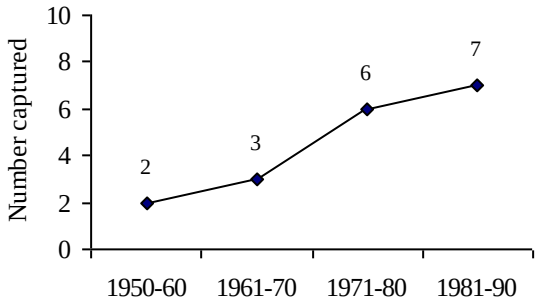


Figure 2: Number of wild caught elephants with private owners

- Only two elephants (both females) were captive born
- The remaining two elephants had been purchased (previous history regarding source of these elephants not known)

M-R was 0.6 (SE= 0.0.3, N= 28) implying a deviation of 90% from E-R.

Purpose of keeping
The reason for maintaining elephants can be considered to be an indicator of the living conditions: maintaining purely for revenue generation may over-ride considering the needs of the animals.

- All elephants were working animals: logging/ for use in tourism/ as *koonkie*; only one owner kept his elephant partly as it was a family tradition and also for use in logging operations

M-R was 2.5 (SE= 0.2, N= 29) with a deviation of 68% from E-R.

Mahout change
When handlers are changed often, it involves a period of adjustment for both the elephant as well as the handler. Hence, the trust or bond between handler and animal is broken. This would result in added stress for the animals.

- Mean number of handlers per elephant was 4.0 (SE= 4.0, N= 21)
- The number of handlers changed per elephant ranged from 2- 10

M-R was 1.5 (se= 0.3, N= 21) with a deviation of 81% from E-R.

Shelter
Wild elephants have been observed to cover vast distances as part of their home range— 250- 1000km^2 (Sukumar, 2006), implying the ability of the elephants to make use of physical space.

- The elephants were kept in the open, tethered to a tree when not working
- Shade was available in the form of trees

M-R for shelter type was 0.0 (SE= 0.0, N= 31) showing a deviation of 94% from E-R.
M-R for shade type was 0.7 (SE= 0.0, N= 31) with a deviation of 90% from E-R.

Water
Insufficient/ contaminated water sources can result in ill-health for captive elephants.

- Water source for the elephants was varied: ponds/ taps/ river/ stream, but all elephants had access to rivers/ streams
- River/ stream as the only source accounted for 38% (N= 29) of all the elephants
- Distance to water source varied from within reach to more than 2kms
- Water quality tests were not done by any of the owners
- Summer bath frequency was twice per day, in winter the elephants were bathed once; Bath duration ranged from 1- 1.5h; scrub materials used were *shau*, hay, coconut husk and stone

M-R was 5.1 (SE= 1.0, N*= 8) indicating an overall deviation of 37% from E-R. Figures 3a and 3b give the comparative rating and Percentage of deviation, respectively, for each of the sub-parameters.

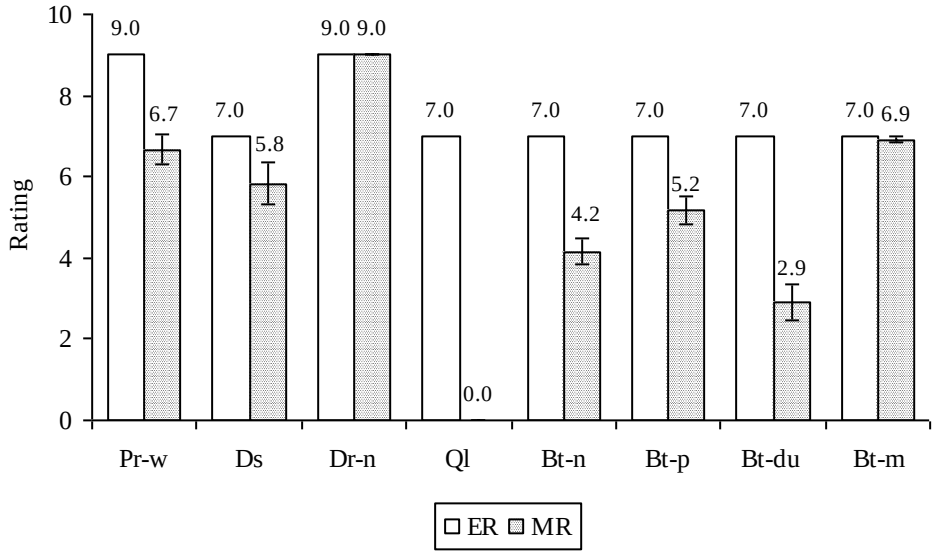
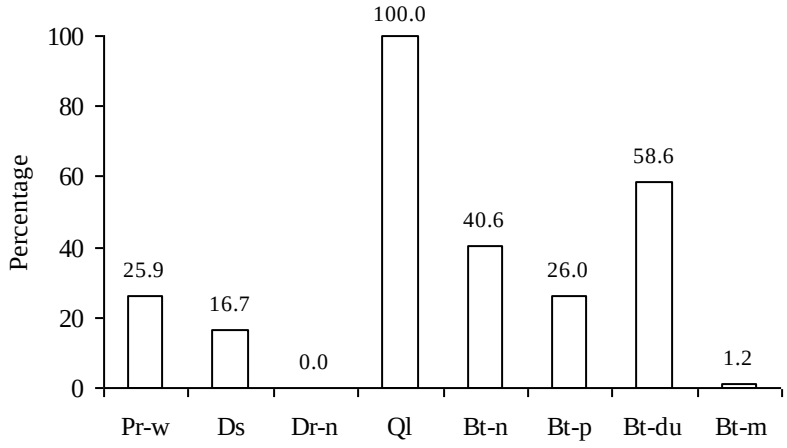


Figure 3a: Comparison of E-R and M-R for 'water' sub-parameters



Pr-w: Perennial source of running water Ds: Distance to water source Dr-n: Number of times drinking water
Ql: Water quality tests Bt-n: Bathing number of times/day Bt-p: Bathing place Bt-du: Bath duration
Bt-m: Bathing materials

Figure 3b: Percentage wise deviation from E-R for 'water' sub-parameters

Sleeping place

Unsuitable surfaces or confined spaces while sleeping will not only be a source of discomfort in the short term but also cause health problems through skin abrasions/ application of prolonged pressure on one area only.

- For 85% of the elephants (N= 27), the tethering site/ camp was also the sleeping place

- Only two elephants were given opportunity to sleep in the nearby forest

M-R was 4.2 (SE= 0.2, N= 26) showing a deviation of 47% from E-R for this single sub-parameter.

Walk

Absence of exercise for captive elephants has resulted in foot problems, ultimately resulting in systemic infections and death (Olson, et al., 1994).

- All the elephants were given opportunity to walk
- Nature of terrain was hilly/ forests/ plain with only one elephant walked on concrete roads
- Distance covered varied from 1-40kms, duration ranged from 1-5h/day

M-R was 4.1 (SE= 2.0, N*= 3) with a deviation of 49% from E-R. Figures 4a and 4b give the comparative rating and Percentage of deviation, respectively, for each of the sub-parameters.

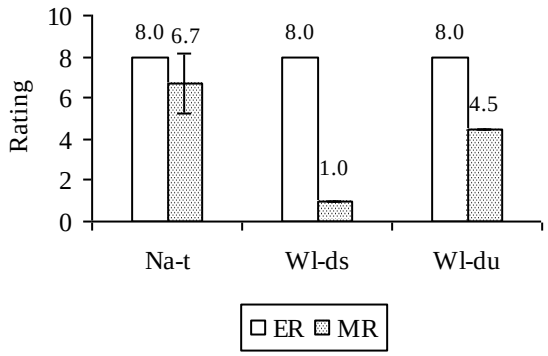
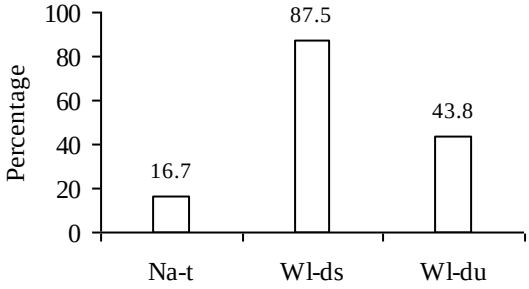


Figure 4a: Comparison of E-R and M-R for 'walk' sub-parameters



Na-t: Nature of terrain Wl-ds: Distance covered Wl-du: Walk duration

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

Social interaction

Interaction among elephants covers a range of methods: auditory, tactile, olfactory and visual, all employed in efforts to communicate with other individuals. Its absence in captive elephants can have serious behavioural/ health consequences.

- All the elephants had opportunity for interaction either in the camp or in the forest with wild elephants, or in the work place
- Hours of interaction ranged from 1-24h; mean number of individuals per group was 3, ranging from 1-5
- Distance between individuals varied from within reach to 70m

M-R was 5.3 (SE= 1.5, N*= 4) showing a deviation of 34% from E-R. Figures 5a and 5b give the comparative rating and Percentage of deviation, respectively, for each of the sub-parameters.

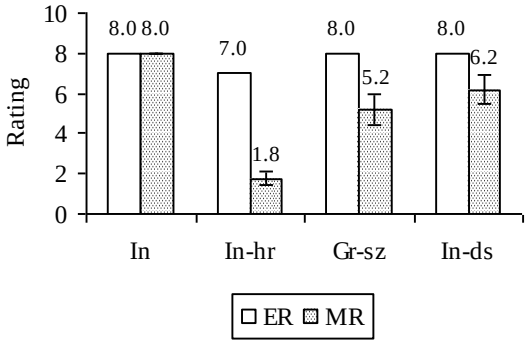
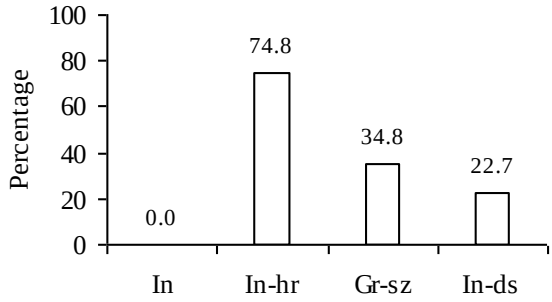


Figure 5a: Comparison of E-R and M-R for 'interaction' sub-parameters



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

Figure 5b: Percentage wise deviation from E-R for 'interaction' sub-parameters

Chaining

Use of chains as a means of control is a universal practice in captive elephant management. This practice, if not restricted as an emergency measure/ for veterinary procedures, can be an effective deterrent in performance of species-typical behaviours.

- All the elephants were chained; chain weight ranged from 25-50kgs, size from 0.6-15cms and length from 15-50m
- 80% of the elephants (N= 25) were allowed to free range at night

- The elephants that were left to range free at night were hobbled/ tied with drag chain; anchor chain was used for two elephants.

M-R was 3.2 (SE= 2.5, N*= 3) with 60% deviation from E-R. Figures 6a and 6b give the comparative rating and Percentage of deviation, respectively, for each of the sub-parameters.

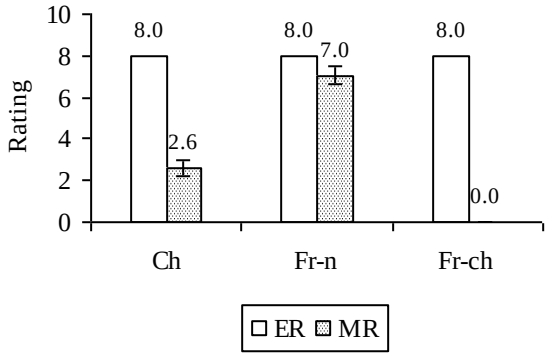
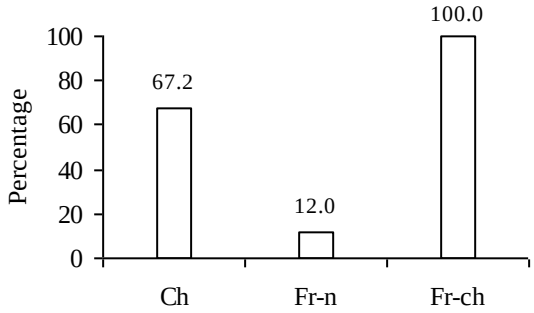


Figure 6a: Comparison of E-R and M-R for 'chaining' sub-parameters



Ch: Chaining status Fr-n: opportunity to free-range at night Fr-ch: Chain type while free-ranging

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

Observed behaviour

Elephants that are quiet/ calm can be handled more easily than those which are unpredictable. Poor living conditions can also result in development of stereotypic behaviours.

- 67% of the elephants (N= 27) were described as quiet/ reliable; two female elephants aggressive;
- None of the elephants exhibited stereotypy
- 33% (N= 15) of the elephants had run amok

M-R was 4.7 (SE= 1.9, N*= 4) showing a deviation of 42% from E-R. Figures 7a and 7b give the comparative rating and Percentage of deviation, respectively, for each of the sub-parameters.

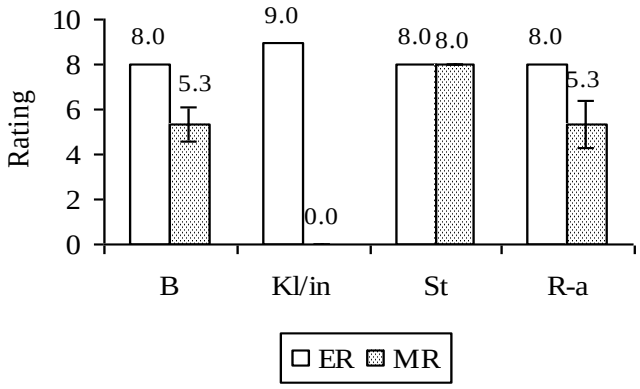
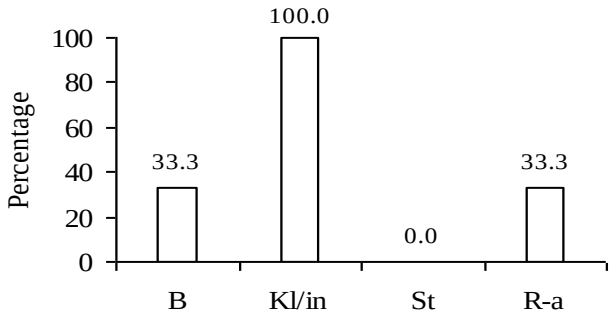


Figure 7a: Comparison of E-R and M-R for behaviour sub-parameters



B: Behaviour (Temperament) Kl/in: Incidents of killing/ injury St: Occurrence of stereotypy
R-a: Incidents of running amok

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

Work

Work is one of the reasons for the continued maintenance of elephants in captivity. This may involve activities natural/ alien to an elephant's behaviour, in conditions with varying provisions of shade/ rest/ food while working.

- 55% of elephants (N= 29) were used for logging related work only, 24% in logging as well as *Koonkie*; only two elephants were used in tourism/ festivals/ in patrolling in addition to logging; no major work was given for two female elephants (40y and 5y)
- Only two elephants (a male and a female) took part in religious processions/ in inaugural functions of business establishments

- Work timings ranged from 6a.m. to 9a.m./ 7a.m. to 10a.m./ 8a.m. to 10.30a.m./ 10a.m. to 12noon and 3p.m. to 4p.m.; *Koonkies* were worked at night
- Mean age when elephants began work was 9y, ranging from 7-17y
- Number of working days was 20-24 days per month
- Shade was available for 79% of the elephants (N= 19); only one elephant did not have access to water; rest was given for all elephants while working; food was not provided for 83% of the elephants during work (N= 18)

M-R was 4.8 (SE= 1.7, N*= 5) showing a deviation of 40% from E-R. Figures 8a and 8b give the comparative rating and Percentage of deviation, respectively, for each of the sub-parameters.

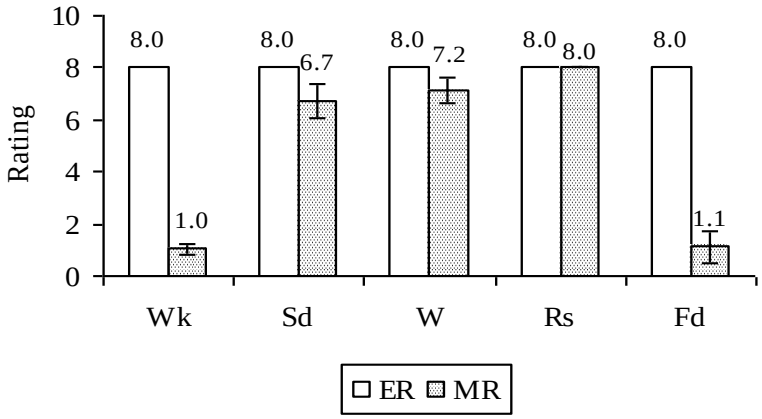
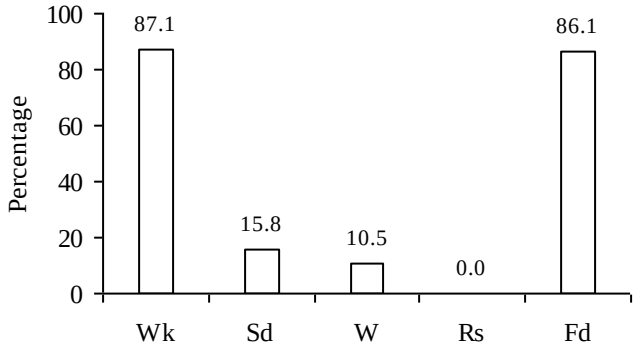


Figure 8a: Comparison of E-R and M-R for 'work' sub-parameters



Wk: Work type Sd: Shade availability W: Water availability Rs: Rest availability
Fd: Food availability

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

Food

Allowing elephants to browse/ graze not only provides opportunity to exercise but also helps in learning to forage in the wild.

- Ninety three percentages of the elephants (N= 27) were allowed to graze/ browse and provided stall feed
- Stall feed included various combinations of Horse gram (*Macrotyloma uniflorum*), Banyan stem (*Ficus*), Para grass (*Urochloa mutica*), Rice (milled grains of *Oryza sativa* along with banyan, Banyan leaves along with grams, Boiled paddy, a boiled mixture of rice, grams and soybean (*Glycine max*), mixture of rice, ghee and grams,
- 36% of the elephants (N= 25) were given mineral mixture
- Ration chart was not used for any of the elephants

M-R was 3.4 (SE= 2.0, N*= 4) showing a deviation of 62% from E-R. Figures 9a and 9b give the comparative rating and Percentage of deviation, respectively, for each of the sub-parameters.

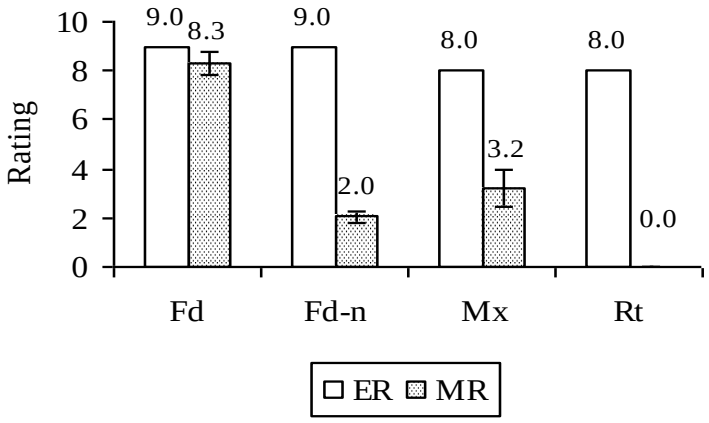
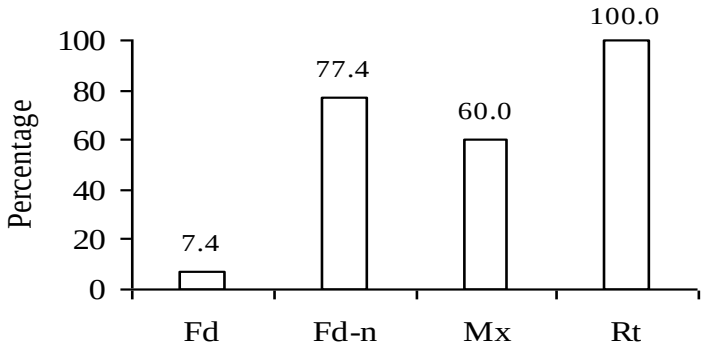


Figure 9a: Comparison of E-R and M-R for 'food' sub-parameters



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

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

Reproductive status

Normal reproductive functioning in captive elephants is subject to a number of biological factors and husbandry practices: poor captive conditions resulting in ill-health/ stress, absence of individuals of opposite sex, restriction on movement due to chaining contribute to reproductive failure.

Female reproductive status

- Data was available for five female elephants: oestrus occurrence was recorded for one
- Three were exposed to males; one female exposed to wild males also
- None of the females had calved

M-R was 3.3 (SE= 3.0, N*= 3) with a deviation of 54% from E-R. Figures 10a and 10b give the comparative rating and Percentage of deviation, respectively, for each of the sub-parameters.

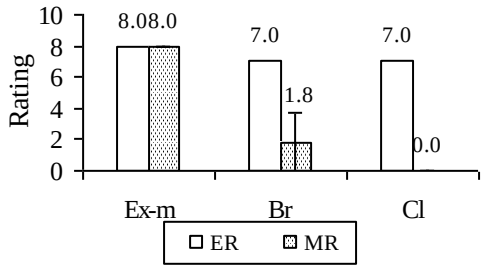


Figure 10a: Comparison of E-R and M-R for female reproductive status

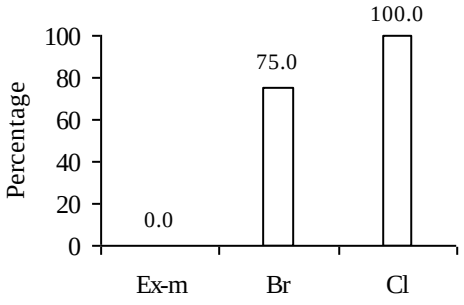


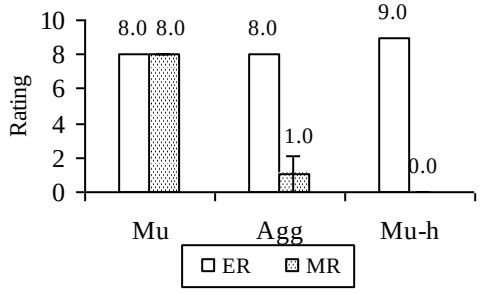
Figure 10b: Percentage wise deviation from E-R for female reproductive status

Ex-m: Exposure to males Br: Opportunity to breed Cl: Calf birth

Male reproductive status

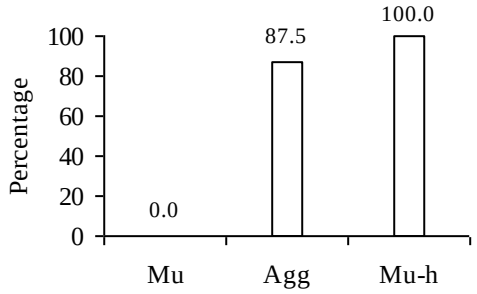
- One adult male was not reproductively active; this male and another had not sired offspring
- All elephants for which relevant data was collected were reported to exhibit musth (N= 6)
- All elephants, except one, were aggressive/ unpredictable during musth; two elephants had killed during this period
- Musth elephants were isolated, chained and watered, feed was reduced

M-R was 3.0 (SE= 3.1, N*= 3) with a deviation of 62.5% from E-R. Figures 11a and 11b give the comparative rating and Percentage of deviation, respectively, for each of the sub-parameters.



Mu: Occurrenc of musth Agg: Aggression during msuth

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



Mu-h: Handling of msuth

Figure 11b: Percentage wise deviation from E-R for male reproductive status

Health status

Captive conditions may predispose elephants to a number of health problems such as prevalence of foot problems (Mikota et al., 1994), excessive weight or malnourishment, etc.

- Occurrence of gastro-intestinal disorders, parasites, abscesses, lameness, toe nail cracks, anemia was reported; left foreleg was fractured for an adult female
- Deworming was done once in 6 months
- Of six elephants for which data was available, three were not immunized
- Oiling was not done for all
- Blood/ urine/ dung samples were tested for all except one elephant
- A 46y old female was suspected to have contracted Tuberculosis and was undergoing treatment.

M-R was 4.6 (SE= 1.3, N*= 6) with a deviation of 43% from E-R. Figures 12a and 12b give the comparative rating and Percentage of deviation, respectively, for each of the sub-parameters.

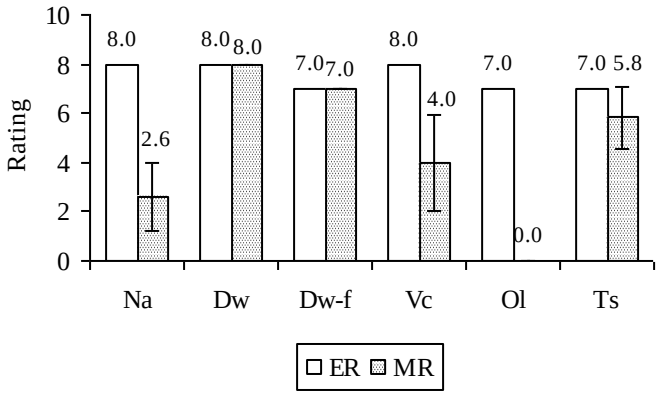
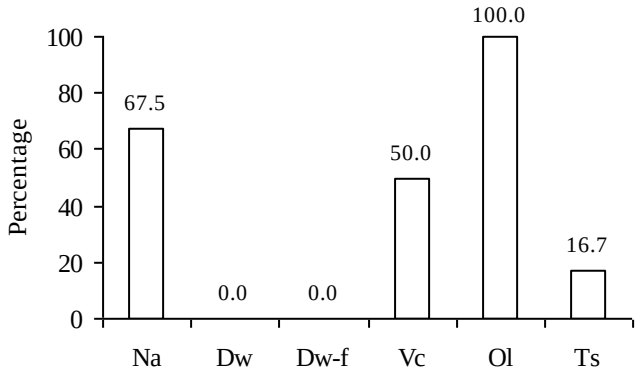


Figure 12a: Comparison of E-R and M-R for 'health' sub-parameters



Na: Nature of disease/ injury Dw: Deworming done Dw-f: Frequency of deworming
Vc: Vaccination done Ol: Oiling done Ts: Tests of blood/ dung/ urine samples

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

Veterinary personnel and infrastructure

A key to maintenance of health of captive elephants is the availability of veterinary personnel with relevant experience. Poor infrastructure can be a major impediment in the smooth functioning of the institution/ management system.

- All observed elephants (N= 6) had access to a veterinary doctor; experience with elephants ranged from 5y – 20y
- Frequency of visits ranged from "on call" to annually
- Except one, all elephants (N = 5) did not have access to a veterinary assistant
- None of the owners (N = 5) maintained records

M-R was 4.1 (SE= 1.6, N*= 6) implying a deviation of 49% from E-R. Figures 13a and 13b give the comparative rating and Percentage of deviation, respectively, for each of the sub-parameters.

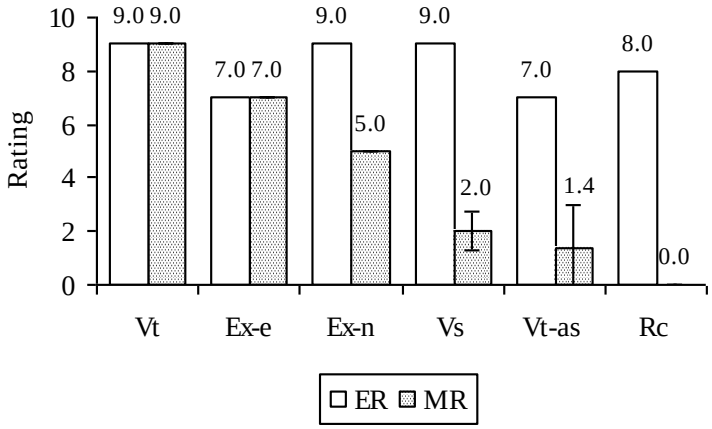
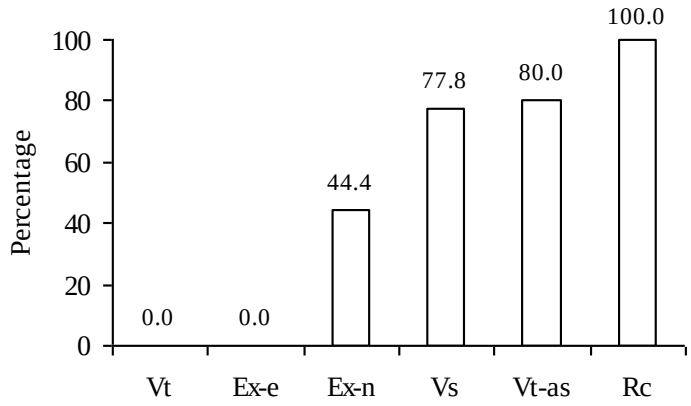


Figure 13a: Comparison of E-R and M-R for 'veterinary personnel' sub-parameters



Vt: Availability of veterinary doctor Ex-e: Experience with elephants Ex-n: Number of years of experience
Vs: Frequency of visits Vt-as: Veterinary assistant availability Rc: Maintenance of records

Figure 13b: Percentage wise deviation from E-R for 'veterinary personnel' sub-parameters

Handler status

Mean age of handlers was 34.8yrs, ranging from 22- 46yrs (N= 7).

Professional experience

Poor experience in handling elephants can be dangerous to the animal as well as the handler or general public.

- Experience in this profession ranged from 2 months to 32y, with four of the seven handlers having more than 15y experience
- Experience with specific elephant ranged from 1.5 months to 20y, with four of the seven handlers having less than five years experience
- Of the seven, five handlers had opted for this profession as a source of employment
- Number of hours spent with elephant ranged from 6- 11h
- All handlers used tools, *Khukri*, *gupti* (foot-length goad with small metal tip at one end), stick, wooden ankush, bamboo stick

M-R was 5.2 (SE= 1.5, N*= 4) with a deviation of 42.7% from E-R. Figures 14a and 14b give the comparative rating and Percentage of deviation, respectively, for each of the sub-parameters.

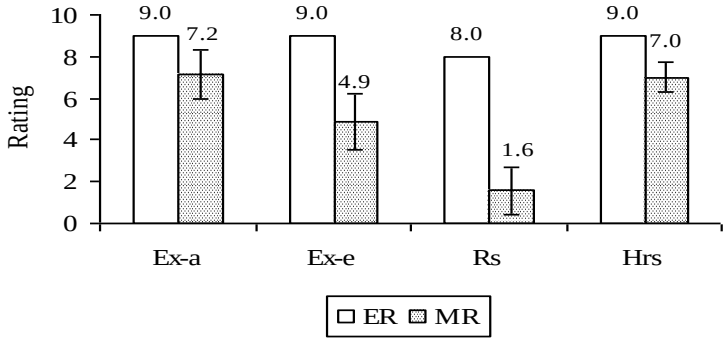
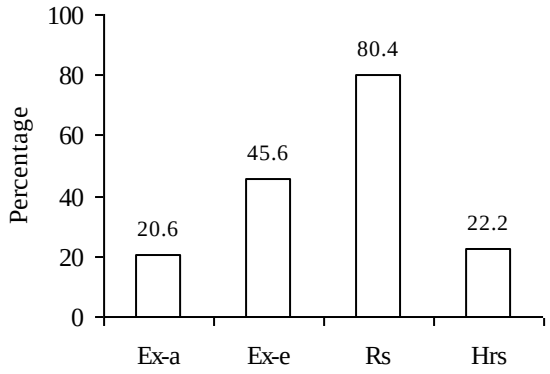


Figure 14a: Comparison of E-R and M-R for 'professional status' sub-parameters



Ex-a: Experience as % of handler ageEx-e: Experience as % of elephant age
Rs: Reason for choosing this profession Hrs: Number of hours spent with elephant

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

Socio-economic status

- Of the five handlers, three had relatives working in the same field; three mentioned farming as a family occupation
- Education ranged from class 4th to 6th, with three of the seven handlers not being educated
- Salary drawn ranged from Rs.12,000/- to 24,000/- annually
- Number of children per family ranged from none to three
- Languages known varied from 1-2
- Insurance cover was not available for any of the observed handlers
- Of the interviewed handlers (N= 7), all, except one, consumed alcohol occasionally/ regularly, after work

M-R was 2.9 (SE= 0.7, N*= 9) implying a deviation of 59% from E-R. Figures 15a and 15b give the comparative rating and Percentage of deviation, respectively, for each of the sub-parameters.

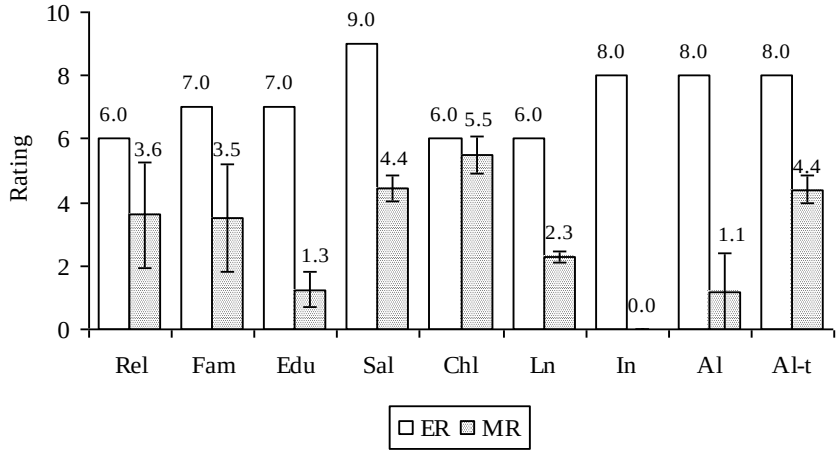


Figure 15a: Comparison of E-R and M-R for 'socio-economic status' sub-parameters

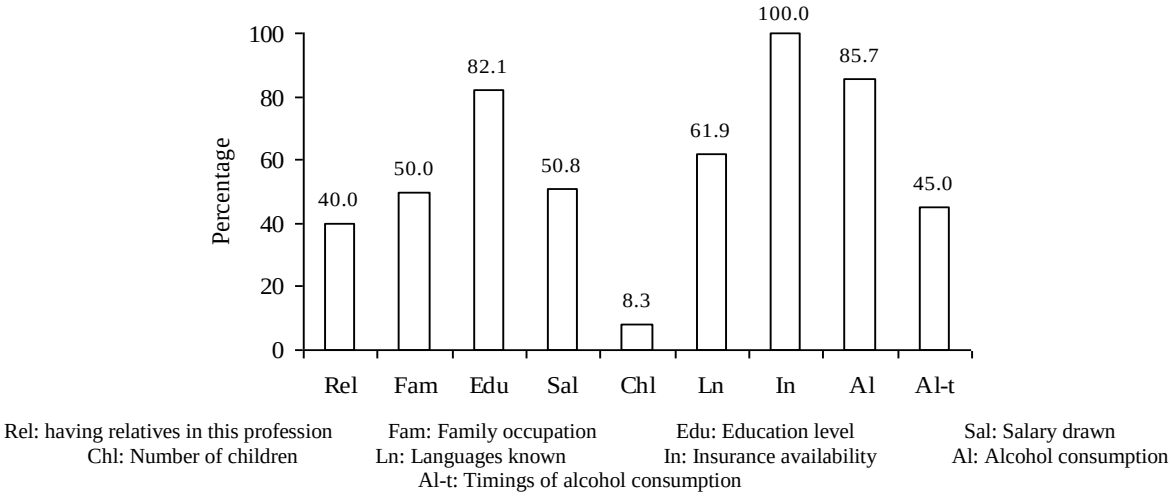


Figure 15b: Percentage wise deviation from E-R for 'socio-economic status' sub-parameters

Overall welfare status

Overall M-R, considering all observed parameters together, was 4.0 (SE= 0.4, N*= 55) showing an overall deviation of 50% from E-R. Figure 16 gives the distribution of Percentage of deviation from E-R across the parameters observed. Deviations of 50% or more from E-R accounted for 49% of the occurrences implying nearly half of the observed parameters deviated to this extent from the norms prescribed by experts.

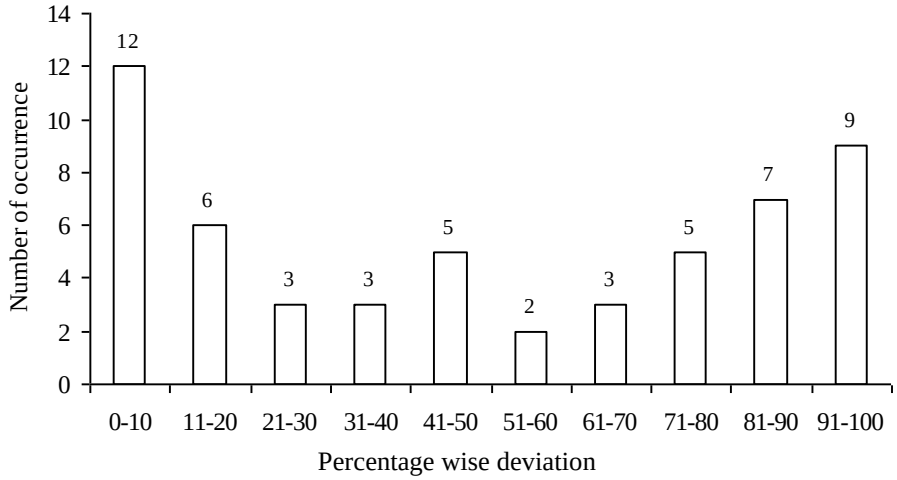


Figure 16: Distribution of Percentage wise deviation from E-R across all parameters

Discussion

The knowledge gained from studies on wild elephants has given a baseline with which to compare the living conditions of captive elephants. Deviations in the biological and ecological conditions experienced in the wild will create a deficiency in meeting the needs of captive elephants.

Features showing 50% or more deviation:

- Most of the elephants were captured from the wild: making them undergo far greater changes in their living conditions in captivity
- The occurrence of natural forest conditions was nullified by tethering the elephants to an area determined by the chain length, thereby effectively restricting performance of species-specific activities such as foraging/ socializing/ walking, etc.
- The activity of walking on suitable substrates (Olson, et al., 1994) is important for captive elephants considering their feet structure. This activity was determined by the work schedule, subjecting the elephants to durations/ distances unlike those performed in the wild
- The maintenance of social relationships across generations of female elephants has been documented (Pool and Moss, 2008). For these elephants, their social structure and relationships were subject to human control: either broken when the elephant was sold/ shifted to a different owner or disrupted by work schedules
- Foraging in natural forest conditions was restricted as the elephants were hobbled/ tied with a drag chain
- Logging operations can be physically exhausting depending on the duration of work and quantity of load carried as pointed in a study (Saseendran, et al., 2009). One of the elephants, a 24y old male, had reportedly injured its tusk following logging work. Another, a 45y old female, had a fracture sustained while working.
- None of the observed females had calved; the observed males had not sired offspring. This will impact the wild population considering that 86% of these elephants have been captured from the wild.
- Immunization of elephants was not uniformly practiced across all owners; records were not maintained

The all encompassing feature of elephants with private owners was the influence of work on their daily activity and opportunities available for expression of natural behaviours by the elephants. Beginning with source of the elephant, where mother-offspring could be separated before reaching adulthood, the animals were traded with a purpose in view: to be used for work or to generate income. The needs of the elephants were secondary to those of the people owning/ using the elephants.

Handler status

- The number of mahouts changed per elephant and the relatively low experience of a handler with his elephant indicates change of handlers. This may cause stress for both elephant and handler as each goes through a period of learning.
- All handlers used more than one form of tool to control his elephant
- Salary paid to the mahouts/ cawadis was low, insurance cover was not available
- Alcohol consumption was prevalent among the mahouts/ cawadis

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Compassion Unlimited Plus Action (CUPA) is a non profit public charitable trust registered in 1991 that works for the welfare of all animals. Since 1994, CUPA has worked in close collaboration with government departments and agencies on various projects. CUPA's mission is to protect animals from abuse and violence and do what may be required to alleviate them from suffering at the hands of humans. CUPA does not differentiate between pet, stray or wild animals, since all of them often 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 to meet the need for an informed decision-making framework to stem the rapidly declining natural landscape and biological diversity of India and other countries of tropical Asia. The foundation undertakes activities independently and in co-ordination with government agencies, research institutions, conservation NGOs and individuals from India and abroad in all matters relating to conservation of natural resources and biodiversity, endangered flora and fauna, wildlife habitats and environment including forests and wetlands. It participates and disseminates the procured information, knowledge and inferences in professional, academic and public forums.

College of Veterinary Science, of Assam Agricultural University, 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) is the world's largest alliance of animal welfare societies with consultative status at the United Nations and the Council of Europe, 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 hundreds of thousands of supporters worldwide.

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North-eastern region of India accounts for 55% of the captive population of elephants in the country. This investigation aims to assess the welfare status of captive elephants and socio-economic status of handlers in Assam under different management regimes. A total of 118 elephants from Forest Camps (FCs), Individuals owning elephants (Private ownership, Pvt.) and a Zoological garden (Zoo) were observed, comprising 71 females and 47 males for the survey.

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