Captive Elephants of Karnataka

An investigation into the Population Status, Management and Welfare Significance

Surendra Varma, P. Anur Reddy, S.R. Sujata, Suparna Ganguly and Rajendra Hasbhavi

Elephants in Captivity- CUPA/ANCF Technical Report 3a

Karnataka Forest Department

Compassion Unlimited Plus Action

WRRC WILDLIFE RESCUE AND REHABILITATION CENTRE

ANCF ASIAN NATURE CONSERVATION FOUNDATION www.asiannature.org

WSPA World Society for the Protection of Animals

Captive Elephants of Karnataka

An investigation into the Population Status, Management and Welfare Significance

Surendra Varma[1], P. Anur Reddy[2], S.R. Sujata[3a], Suparna Ganguly[3b] and Rajendra Hasbhavi[4]

Elephants in Captivity- CUPA/ANCF Technical Report 3a

1: Research Scientist, Asian Nature Conservation Foundation, Innovation Centre, Indian Institute of Science, Bangalore - 560 012, Karnataka; **2**: Chief Conservator of Forests, O/o Chief Wildlife Warden, Government of Karnataka, 2nd floor, Aranyabhavan, 18th cross, Malleswaram, Bangalore- 560 003, Karnataka; **3a**: Honorary President, **3b**: Researcher, Compassion Unlimited Plus Action (CUPA), Veterinary College Campus, Hebbal, Bangalore 560 024, & Wildlife Rescue & Rehabilitation Centre (WRRC), Bannerghatta Biological Park, Bangalore – 560083, Karnataka; **4**: Nisarga, Old. 59, New. 27, 1st 'A' Main Road, West of Chord, Mahalakshmi Layout Entrance, Bangalore -560086, Karnataka

Published by
Compassion Unlimited Plus Action (CUPA)
Veterinary College Campus, Hebbal, Bangalore 560 024
www.cupabangalore.org

In collaboration with
Asian Nature Conservation Foundation (ANCF)
Innovation Centre, Indian Institute of Science, Bangalore 560 012
www.asiannature.org

Title: Captive Elephants of Karnataka
Authors: Surendra Varma, P. Anur Reddy, S.R.Sujata, Suparna Ganguly and Rajendra Hasbhavi

Suggested citation: Varma, S., Reddy, P.A., Sujata, S.R., Ganguly,S., Hasbhavi R. (2008). Captive Elephants of Karnataka; An investigation into the population status, management and welfare significance. Elephants in Captivity: CUPA/ANCF-Technical Report No. 3a**.** Compassion Unlimited Plus Action (CUPA) and Asian Nature Conservation Foundation (ANCF), Bangalore, India

First limited Edition 2008

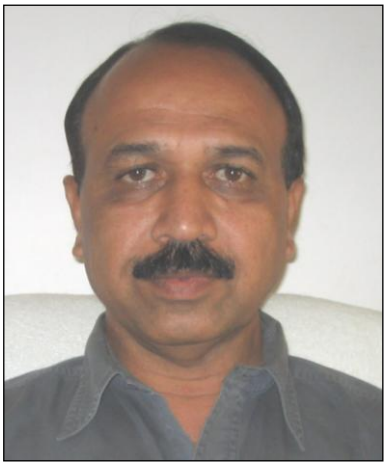
Published by CUPA & ANCF
ISBN 978-81-910465-1-9

To order copy of this book, please write to

Compassion Unlimited Plus Action (CUPA)
Veterinary College Campus, Hebbal
Bangalore 560 024
Email: cupablr@gmail.com

Or
Publications officer,
Asian Nature Conservation Foundation (ANCF)
Innovation Centre
Indian Institute of Science
Bangalore 560 012
Email: publications@asiannature.org

Dedicated to



Late Dr. Vishwanath

For his vision and service to animal welfare

CONTENTS

Preface

Karnataka supports one of the last remaining viable habitats and populations of Asian Elephants. Similarly, the number of captive elephants in the state is also significant. As per the records, there are about 163 captive elephants (under five different management regimes). The majority of the elephants belong to the forest department; the department has captive elephants at its major forest camp sites like Bandipur, Nagarahole, Sakrebyle, Dubare. The government run zoos Bannerghatta Biological Park (BBP) and Chamarajendra Zoolgical Garden or Mysore Zoo, too have captive elephants. Most of the private elephants are with temples and mutts. Notable private holdings are the seven elephants of Maharaja of Mysore and Aane Mane Foundation which has three elephants.

Collecting data from these management regimes was a unique experience, which focused on the actual status of the animal and methods that are adapted to take care of both the elephant and its handler. This investigation was focused on understanding the problems faced in keeping elephants as observed in the different management systems, its effect on the welfare of the elephants/handlers, and aims to serve as a baseline data for solutions, which would in turn help in better management. A group comprising wildlife experts, veterinary doctors, researchers and NGOs was assembled to review the datasheet which was developed by the ANCF/CUPA research team. The detailed datasheet deals with all the features like elephant measurements, status of the animal, health, feeding area, facilities provided, food provided with any guidelines or charts, hygienic condition of the living area, temperament and abnormal behaviour of elephants, reproductive status, availability of veterinary doctors to attend the animal and status of mahouts/cawadis and their details.

A training programme was held at Sakrebyle Elephant camp to train the field researchers participating in the data collection process. Elephant experts and veterinary doctors provided training for the researchers while demonstrating the methodology at the campsite on available captive elephants. Later, a trial survey was run for researchers by experts at Mysore Zoo, Mysore Palace, Nanjangud Temple and Bandipur Elephant Camp for a week. Then the lacunae or shortcomings encountered during the trial were further rectified. A review meeting was also held with experts and interested individuals from Karnataka, Kerala and Tamil Nadu at Bannerghatta, Bangalore. The findings and experience of the researchers were presented and discussed before the experts for their critical inputs. The survey reveals that presence of some elephants in institutions as well as mortality data not being recorded/updated. It may be stated here that captive elephant-keeping data is not all the time the easiest information to gather or sometimes, even to access. This is because private owners, circus companies and even temples view the investigation as an invasion of their privacy. This may be one of the foremost reasons that could prevent the truth to emerge on actual status of elephant-keeping in these management regimes.

The findings that are presented through this document are first of it's kind, and hope to provide much needed insights on elephant-keeping in Karnataka. The document has eight sections, the first covers overall status of elephants and handlers of the state, the results are based on comparing the welfare status of elephants across five management regimes

namely forest camps, zoos, circus, temples and private holdings. This section also has specific recommendations for captive elephant management for the state. The second section is dedicated to provide insights into the status of captive elephants in forest camps of Karnataka, the third on captive elephants in zoo, the fourth on temple elephants and the fifth and the sixth on private holdings and circus, respectively. Sections three and six are further divided into two sub-sections, the sub-divisions provide the patterns of difference in managing elephants within the specific sections; for example, Bannerghatta Biological Park and Mysore Zoo could be brought under one unit of zoos of Karnataka; however, the management in terms of space provided to elephants in these two zoos is different, and the same is true for the two private holdings. Given the differences in management approaches within these sections, sub-sections were evolved with the assumption that they may provide insights into difference in management within the same management regimes with possible consequences on welfare of the elephants.

Acknowledgement

The captive elephants of Karnataka were surveyed with financial assistance from the State Forest Department (Wildlife) and the World Society for Protection of Animals (WSPA), UK. Specific thanks are due to R.M. Ray, A. K Varma and I.B. Srivastava, Chief Wildlife Wardens, Deputy Conservators of Forests of Bandipur National Park, Rajeev Gandhi National Park, Madikeri Forest Division, Shimoga Forest Division and Executive Director, Bannerghatta Biological Park and Director of Chamarajendra Zoological Garden for their keen interest, support and concern on improving the quality of the management and welfare of elephants and their handlers through the specific investigation.

Special thanks are also due to Harish Bhat, Shama Karkal, Vydehi Kadur, Daniel Sukumar, Savitha Nagabhushan, Deepika Prasad, Gauis Willson, Ramesh Belagere, Gurudutt, Beena, Dilip Humcha and Karthik, who provided critical data and information of the animal. Sanober, Pauline and Santosh provided their assistance in data entry. Forest Department staff and volunteers accompanied and provided valuable support in the field and our thanks are due to all of them. Shiela Rao of Compassion Unlimited Plus Action (CUPA) provided critical inputs. Sreenivasa Rao, Guruprasad and Susanto Sen provided editorial support.

Initial data collection was carried out with the support of college/school teachers, researchers and personnel from NGOs from different districts of the state, who had taken part in the first one-day workshop organized at Sakrebyle Elephant Camp to get themselves trained for collecting data from different management regimes in Karnataka. Special thanks are to all those teachers who helped us in identifying interested students and participated in the data collection, particularly Ramakrishnappa, N. Indiramma, C. Krishnegowda, Girish, Madhav, Keshav Hegde Korse, Mukunda, Gopalakrishna, Ravi Kumar, Chandrappa G. Basappa, and H. H. Venkatesh.

This work was possible with the support we have received from Philippe Gautier and Prajan Chowta of Aane Mane Foundation, Meenal Moray of Art of Living Foundation, Vishalakshi of Tusker Trails, Bandipur, Laximinarayana, Manager, Mysore Palace and Pandiyan, Manager, Bangalore Palace, and several other individuals from temples (keeping elephants), and we are very thankful to them for their support and interest in this survey.

Section 1
Captive elephants of Karnataka

Executive Summary

The conditions of captivity in which elephants live vary across a wide-spectrum of features; it is important that their welfare is assessed objectively for their well-being. This investigation assesses the welfare of elephants maintained in captivity by different management regimes in Karnataka. It also considers the welfare of the mahouts/cawadis.

Welfare status in this study has been assessed based on the extent of deviation in living conditions from those experienced by their counterparts in the wild. The parameters considered are the physical environment, social and behavioural features and care by veterinary personnel and access to veterinary facilities.

Data was collected through observation of animal(s) and interviews with personnel/management representing various aspects of the elephant's life in captivity. It was analysed using a rating scale developed by a team of experts (experts on both wild and captive elephants) veterinarians, managers, handlers and welfare activists who rated different parameters/sub-parameters based on their importance to the welfare of captive elephants.

Five management regimes namely forest camp, zoo, circus, temple and private individuals were classified based on ownership details provided. A total of 153 elephants covering different management regimes, representing approximately 90% of an estimated total of around 163 captive elephants in this state were observed from the state and data collected. The distribution across regimes shows that the Forest Department camp elephants score well over others followed by those owned by temples, zoos, private owners and circus in that order. The survey suggests that forest camps (FCs) maintain more males followed by zoos. More females are seen in the other four regimes. The age class distribution is biased towards females in all regimes.

Forty-one percent of all the captive elephants were wild when caught, 23% captive-born, 26% purchased/ gifted and 10% rescued; captive-borns were reported in FCs, zoos and circus and none in temples.

Regarding shelter, forest camps provided near-satisfactory conditions; temple elephants were housed within man-made boundary walls with predominantly hard floors; zoo elephants were provided both natural vegetated areas with suitable flooring and man-made enclosures. Elephants owned by private owners were provided natural flooring with variation in shelter type. Circus elephants were chained near their tents without access to forests or natural conditions.

Forest camps had access to rivers/streams while temple-owned animals depended largely on taps with only a few having access to rivers; zoo elephants had access to lakes, ponds as also tanks and taps; circus elephants were provided water in buckets. The Private ownership, Mysore Palace elephants had access to tap water while Aane-Mane elephants were taken to a river in the forest. All the observed institutions scored lower rating than the recommended ones with forest camps and circuses scoring comparable values.

The availability of suitable space and the duration of sleep were rated across three sub-parameters; natural forest provides the best sleeping area for the elephants, available for FC elephants. FC elephants walked in surrounding forests, temple-owned ones on roads, crop fields, around temples, etc., Mysore Zoo elephants within the enclosure, circus elephants on tarred roads, and palace elephants within the palace limits; Aane-Mane animals roamed in the forests, Bannerghatta Biological Park (BBP) elephants walked within their morning enclosure as well as in the surrounding forest.

FC elephants had opportunity to interact with other elephants, whereas in temples nearly 44% of the animals were not allowed to interact as a consequence of maintaining single elephants. Mysore Zoo elephants were allowed to interact, but for the lone male which was segregated; BBP allowed its elephants to interact in the enclosure as well as when left in the forest to range free. Circus elephants were allowed to interact when not working. Mysore Palace elephants were allowed to interact when not working and Aane-Mane elephants, consisting of two adult females and a male calf, were allowed to interact without any restrictions.

The work performed by FC elephants included patrolling/kumki/safari in surrounding forest areas; while the temple elephants blessed people and offered pooja, standing for hours in one place. A few elephants, both in Mysore Zoo and BBP, all elephants in Mysore Palace were used for tourist rides. Circus elephants perform for an audience everyday, and Aane-mane elephants had no specific work assigned to them.

Seventy-eight per cent elephants were provided with free-ranging opportunity and stall feed in FC, and 25% were reported to have raided crops. Only seven per cent temple elephants were allowed to range free. Mysore Zoo, Mysore Palace and circus provided only stall feed. BBP elephants were both stall-fed and are also allowed to range free to browse/ graze in the adjoining forest.

High rating has been given for elephants from forest camps, in the context of reproductive status, and reproductive expression. The camps appear to replicate to the extent possible conditions found in the wild. Ratings for health management suggest that zoos are in a better shape in this aspect and temples garner very low points.

The mean and expert ratings for mahout/cawadi do not match with each other for any of the management regimes investigated. The match for zoo was 77% of expert rating and with high variation it was 71% for circus.

The overall rating for all the parameters among the different regimes suggests that forest camps, zoos and private owners exhibit comparable ratings, and FCs outscore the rest. Comparatively low ratings were observed for temples and circus elephants.

The availability of forest areas along with opportunity to range free in the company of other elephants has led to a near-natural environment for the FC elephants. Zoo elephants have access to interact and one zoo (BBP) has even allowed its elephants free ranging environment in the surrounding forest. Circus elephants were chained for most parts of

the day and interaction was restricted even when other elephants were present. There was variation in the facilities provided by the two types of private owners surveyed. While Mysore Palace elephants were restricted in their movements to their premises, Aane-mane elephants were allowed to range free in the adjoining forest.

Recommendations

Forest camp and zoo elephants

The presence of river/water bodies, forest cover and veterinary intervention makes forest camps the best model for elephant keeping. However, there is conspicuous lack of clarity in the objective of establishing forest camps and zoos and their contributions to conservation or welfare. Decidedly, there appeared to be no direct role is being played in conservation as no animals are released back into the wild to replenish the wild stock. If the objective is welfare, then increasing the numbers through breeding makes little sense due to the concomitant shortage of resources including land, water, manpower and budget.

In the current scenario, we recommend that fulfilling welfare needs adequately would require a check in elephant breeding. While breeding may constitute a positive indicator of the health and environment of an elephant, reproduction is meaningless unless the increased numbers get an equal if not better quality of life. We also do not recommend separating individual elephants from family herds.

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

Space

There is a need to change the management of elephants that are tied for long hours in some forest camps. Most elephants have limited foraging movement, since their feet are shackled or are tied to heavy drag chains.

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

Specific "musth" management for male elephants should be considered like an enclosure (fenced area of 2 or more acres) where such animals could be housed for up to 2 months. This is preferable to shackling and leaving them in the same spot for 4–8 or more weeks at a time. A specific design for fenced or elephant proof trench-based enclosure should be considered. Issues such as the animal injuring itself through the fence or accidentally falling into the trench should be given priority.

Management of campsites should be changed periodically depending upon the availability of fodder and water. In doing this, we need to address the mahouts' requirement of accommodation, etc. All forest camps in Karnataka have to consider alternative campsites so that there is enough foraging material and water in different seasons**.** This needs planning and management and should not be based on random decisions on site selection.

Water

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

Water quality should be checked periodically and campsites rotated according to availability and quality of water. Sources of contamination, if any, should be identified, e.g. agricultural, industrial, human waste, etc.

Diet

Forest/Camp elephants naturally forage for bulk of their diet. Usually, their feet are securely shackled and they are unable to roam freely to forage. Additionally, foraging does not meet the elephants' requirements during the summer months. It has been noticed that almost all mahouts and cawadis are reluctant to leave their elephants further afield, since it entails extra work in retrieving them in the mornings. Supervision of mahouts and periodic inspections and incentives should be initiated.

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

Diet charts (depending on age, sex, work load, pregnancy, lactation and musth) spanning different times of the year have to be extensively worked out and displayed, in consultation with researchers and veterinarians. Most camps have no diet charts or have poorly developed ones. Supplements of vitamins and mineral mixtures should be considered.

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

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

Provision of food in zoos

Since wild elephants spend almost 80% of a day in foraging, provision of highlynutritious food in large quantities in zoos, frees up the time available for theseelephants. Hence, provision of browse (leaves, branches) as an enrichment device

might be considered. This suggestion is specific to Mysore Zoo in Karnataka, as Bannerghatta Biological Park exposes the elephants to free-ranging management.

Exercise and work

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

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

Patrolling or use as kumki for conflict mitigation constitutes better alternative activity for forest camps and national park elephants. This is to be preferred over using the elephant for tourist ride. This activity should not compromise the elephant's foraging or its access to food and water.

Zoo elephants lack proper physical exercise due to the constraints of space. The elephants of the Bannerghatta Biological Park are in a relatively better position due to the presence of forest regions. These forests result in the elephants getting their natural forage and exercise. Some arrangement has to be made for proper physical exercise of the Mysore Zoo elephants. Rotation of elephants with camps is a possibility as Mysore is close to Nagarahole where it is possible to relocate them in natural setting. However, since zoos are not adequate for the conservation of elephants, especially breeding, the number of animals displayed should be reduced to the minimum, and probably selected among retired camp elephants that present no more prospects for breeding or work.

Elephant enclosures, especially in zoos, tend to be monotonous. This is despite their large home range size. As elephants are active for 75% of the day, it is important to provide for their normal activities, e.g. dust baths, mud wallows, browsing, foraging, challenges to retrieve food, appropriate social interaction, scratching posts and other environmental enrichments and stimulations. In fact, zoos are good to keep a few retired camp elephants that are well trained, and are easy to handle.

Training

Three aspects need to be considered

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

The existing methods of training appear to be primitive and may be detrimental to the animal's welfare.

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

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

Reproduction

Increasing the numbers of births compromises the welfare of elephants due to scarcity of resources. Therefore, even though reproduction is a signal of welfare, there is no existing vision (policy) to increase or decrease population in camps/ zoos.

Our data seems to suggest there are only a few breeding females in the population in Karnataka. As temples maintain predominantly female elephants, most of the elephants have also been sourced out to these places.

A policy document should be made available on reproduction and the following features should be considered

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

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

Veterinary care

Although some camps have no resident doctors, the camps are not located far from those that have a veterinarian in place. The ratio of doctor to elephant is approximately 1:18. Doctors in zoos may be burdened with other responsibilities/taking care of other animals. Therefore, many elephants may not get timely medical attention. This aspect has to be critically reviewed depending on work load.

Some of the problems faced in veterinary care are:

Doctors do not have access to timely laboratory reports enabling them to take appropriate medical action. Most reports reach them in 45 days to one year, rendering lab results worthless.

Veterinarians may like access to modern, contemporary, reasonably well-equipped laboratory.

There should be scope for veterinary research. Presently, limited funds may be available from the department. However, these may be insufficient for detailed investigations or follow-up.

Government approvals for emergency testing are time-consuming and therefore valuable time needed for treating affected animals is lost.

The following procedures need to be followed:

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

Equipment related to handling animals

Information on the current status of equipment such as chains, ropes and howdah is very sketchy or not critically reviewable. However, some like leg chain, "bedi" or collar, neck chain, etc. have to be periodically replaced. Howdah used for tourist rides should be regularly checked to ensure that it does not hurt the animal.

Body measurements

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

Simple body condition measures should be documented regularly like visibility of ribs, scapula and buckle cavity. These measurements are an indicator of the captive animal's health condition. The departmental veterinarian should maintain all data in a health or medical register. The department could also have collaborative projects with universities/ research for scientific data collections.

Maintenance of records

Except for a few camps, the maintenance of records, especially the service records (SR), are poorly compiled and maintained. This shows serious lack of interest, no monitoring and consequently, no scope for improved management.

Manager and mahout/cawadi have to be trained on the maintenance of basic documents related to individual elephants. There has to be mandatory maintenance of the SR of each

elephant and this needs to be updated on a timely basis. Records in most national parks and forest camps are poorly maintained and rarely updated.

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

Overall management of zoos

It is commendable that the BBP is maintaining elephants related to each other. This will help in nurturing a more natural group structure. However, the objective of the zoo needs to be defined in the backdrop of availability of forest area in the vicinity. Given conservation of species as one of the objectives, successful breeding among captive females needs to be considered vis-à-vis the future of a growing captive population. The zoo has recorded 18 births from the present set of adult females. However, only two generations of mother–daughter pair are to be found. The zoo needs to formulate a policy to maintain a certain number of individuals while taking a decision on a growing captive population. One option could be to release into the wild, following an established and standard health protocol. The other could be to transfer entire groups to different institutions, rather than the present practice of separation of single individuals. This practice of separation from an established group could be stressful for both the individual and the new group (Clubb and Mason, 2002).

Given an objective of educating the public about the importance of wildlife, maintaining elephants in un-natural captive conditions, despite availability of a forest nearby, does not seem appropriate. A decision on whether the elephants will be subject to free contact training needs to be taken. This will attain significance if a decision is taken to release them into the wild. Training mahouts/handlers to observe behaviour of related and un-related elephants when they are together will help in managing the animals better, while providing a database for research.

Funds

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

Elephant mahouts/cawadis

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

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

Due to frequent change of handlers, the experience of mahouts/cawadis in handling particular, individual elephants is not high. Both mahouts and cawadis show poor education level. Salaries provided are insufficient. This is true of insurance coverage as well. Consumption of alcohol seems to be high amongst both. Mahouts and cawadis are clear that their children would not join the profession. If elephant-keeping is to be successful, certain incentives for the families of the mahouts need to be initiated. Only then would it be seen as a profession of choice and not of poverty and illiteracy.

Transfer or exchange of elephants between facilities

Several studies suggest that movement across facilities breaks social bonds, especially among females. The shifting of animals leads to disruption of hierarchy and results in related problems. It may also result in aggression towards an animal, which has been reintroduced into its own group. Transfers or relocations of elephants should be done after much thought. Necessary discussions with the mahouts and handlers need to be undertaken to avoid arbitrary and random movements, which may disrupt an elephant's emotional ties with related herd members.There are usually some “problem” elephants in zoos and camps, brought in through confiscation or dumped by private owners or agencies unable to cope with the animal. Thereafter, these are parked in forest camps and zoos. These elephants require a different management concept with a specific and more care-oriented approach.

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

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

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

There is also a clear scope for the formulation of a care facility, which is NOT necessarily a forest camp or zoo, due to the existing numbers of suffering and abused

captive elephants across the states. Care centers need to be placed within a forest and close to a river. A non-wild elephant area may also be considered.

Adoption of elephant FC/zoos

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

Temple/Mutt elephants

Keeping of elephants in temples and ensuring their welfare therein seems to be an uphill task. The recommendations clearly indicate that though it would be best to phase out temple elephants over a designated period of time, their current management need controls and checks.

Temple elephants are individually housed with usually not more than one elephant per temple. This is the first of many unnatural conditions the temple elephant has to deal with. Working conditions are poor; exposed to long hoursof unnatural behaviour (blessing and seeking alms several times a day), standing still for long periods of time on concrete, asphalt or other hard flooring lack of space, exercise and shade). These factors make the average temple and circus conditions the worst in managing captive elephants.

Permission-giving authority

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

It is in the interest of the elephants and general public that NO NEW ELEPHANTS BE BROUGHT UNDER THE MANAGEMENTOF TEMPLES/MUTTS/ASHRAMS.

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

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

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

The term "upkeep, maintenance and housing" as stated in section 42 of the Wildlife (Protection) Act 1972, should be clearly defined and standards of grading should be urgently initiated to prevent confusion amongst the inspecting personnel.

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

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

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

Animal care

Most temple elephants suffer from lack of space, isolation and have no arrangements for exercise, bathing, free ranging or interactions. These conditions should be improved in whichever way possible. In fact, some elephants have no proper resting place even at night since the temple premises have restricted areas.

Most temples with elephants are not able to provide optimal conditions, though they may have financial resources to do so. This is because the needs of the elephants and those of the temples are disparate. These temples should be barred from keeping elephants in future. Conditions existing at the temples need to be thoroughly evaluated before ownership is granted to applicants.

A report by Clubb and Mason mentions:

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

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

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

Temple/*mutt*/privately owned/circus elephants could be housed permanently in forested and river-based regions. Many such housing facilities could be created across the states. The management of these elephants (fund, feeding, work, keeper and other aspects related to it) may come under temple/*mutt*/private/circus, and work for elephants (viz festivals, circus activities), may be decided by the owners, but the housing facilities offered in forested (private or reserved forests) or river-based region may improve the quality of the management substantially.

Food and Water

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

Sufficient supply of food is often lacking due to faulty utilization or lack of funds observed in many private and government-owned temples.

Feeding of inappropriate and "junk" food owing to lack of knowledge and awareness about proper nutrition often leads to severe health problems.

Water is scarce due to lack of storage options and lack of hygienic facilities. Water for all elephants, in all management regimes, needs periodical checking for chemical or sewage contamination.

Health Care

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

Routine health check-up for temple elephants needs to be made mandatory. In case the CWW gives permission for ownership of elephants by private individuals or temples, guidelines need to be formulated in advance with the medical team. This would ensure that the check-ups are specific in nature and are not general clearances offered by the veterinarian as a routine procedure.

Before permissions are granted for the keeping of elephants, the CWW should ascertain the availability of qualified and experienced veterinarians in the area.

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

Since elephants are subjected to high stress due to monotonous routine, lack of interaction and small area of confinement, the CWW should be very careful in awarding permissions as per Section 42 of the Wildlife (Protection) Act, 1972.

Work Conditions

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

The practice of blessing by the elephants should be treated as an offence
Physical exercise is often neglected and if the elephant is walked, it is made to do so on tarred roads. This is not recommended because of the animals' special feet structure. If they must be made to walk on hard substrates/tarred roads, it should be at a time suitable to the elephant's temperature tolerance, early mornings and late evenings.

Temple elephants are also often placed in locations least suited to their needs, and such negligent temples should not be permitted to keep elephants.

Festival elephants
In addition to temple elephants and those owned by private owners or circuses, there are elephants that take part in seasonal festivals. The elephants attract huge crowds and partake in the rituals.

> There should be a policy of rigorous scrutiny by the concerned department, with assistance from NGOs and other agencies, to scrutinize the season, hours, nature of work, etc. of the elephants participating in festivals. Efforts should be made to discourage this new and unsuitable trend.
>
> It is time to initiate the process of applying for formal permissions to the State Wildlife Department by concerned bodies for granting approvals for religious or commercial activities. This direction would give an opportunity to regulate and control the usage of captive elephants for such purposes.

Logging elephants
Elephants are used for logging in the border areas of Karnataka. They operate under the auspices of a broker, who hires them from elephant owners in Kerala for off-season work in neighbouring states.

The Forest Department of Karnataka should crack down heavily on the brokers who arrange for the elephants to be brought in illegally across the state borders and book cases against the owners.

The entire exercise is against transportation laws, necessary documentation and permit requirements that have been clearly spelt out in the Wildlife (Protection) Act, 1972.

Local people should be asked to be monitoring agents for the Wildlife Department to immediately report these cases to the concerned authorities. Ownership documents of these elephants should be scrutinized, as in many cases they are forged or inaccurate copies that have no validity.

The commercialization of captive elephants should be discouraged wherever possible, since this activity is denuding the forests of precious genetic material.

Circus elephants

Circus elephants enter Karnataka approximately once a year, usually in the December–January season, numbering six or seven elephants, with ages ranging from 4 to 35 years. They are showcased in three shifts for 15 minute each starting from 1pm to 8 pm, 30 days a month. These activities strain their normal behaviour and welfare due to confined spaces, constant restraint, unhygienic conditions due to lack of tethering spots, lack of water for drinking and bathing, etc.

The use of elephants in circuses should be banned, as they do not have access to natural lifestyles or conditions. Since there is absolutely no scope for improvement in the condition and welfare of these animals, NO NEW ANIMALS SHOULD COME INTO THE INDUSTRY.

The elephants kept currently should be micro-chipped and monitored by multi-agency assistance so that no new elephants can be introduced in the entertainment industry. These elephants should be the direct responsibility of the State Forest Department, Animal Welfare Board of India, and Central Zoo Authority and the trend is phased out eventually.

If circus elephants are found to be in poor state of physical and mental health (as identified by experts), the state needs to confiscate the said animal.

Privately owned elephants

Currently, only 2% of this group lives under good welfare conditions including adequate water, freedom of movement, interaction with other elephants and semi-forested living/movement area. About 78% live in very poor environment and suffer from lack of facilities that constitute good elephant-keeping. This group is also used for financial and commercial activities that severely compromise their welfare.

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

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

The records should be maintained and ownership papers withheld if the animals are being commercially exploited.

Living conditions should be provided with day-and-night shelters with earthen floors, bedding (specifically for those animals which are kept on concrete flooring for day and night shelters), water facility for drinking and bathing, feeding against diet charts, trained veterinarians, information about births and deaths and appointment of trained mahouts should be the norms for private elephant-keeping.

Good ownership and elephant keeping should be encouraged and made into models for other elephant owners to follow.

Mahout/Cawadi welfare

Basic facilities

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

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

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

Social Security

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

There are no benchmarks for their work and their performance is not under any scrutiny. There are neither laws nor regulations that seem to apply to

them. Due to their nature of work, they are unable to organize their labour force to the level of a workers' union.

The importance of health checks for mahouts cannot be overstated. However, rarely have any medical check-ups been conducted or fitness criteria adopted for recruitment of mahouts. This may be due to lack of knowledge and interest or tendency on the part of owners to cut costs. Mahouts should be registered by the department, given a professional card after a medical check-up to be renewed periodically and the employer should be forced to take an insurance policy for them.

Management

There are many issues faced by the management, be it an individual owner, temple authority, or a deputed officer in Government-owned temples in maintaining the elephants and mahouts. General recommendations to improve management are:

Documentation

Maintenance of SR (Service Registers) of animals and mahouts, currently unavailable due to negligence and lack of knowledge.

Strict medical histories of the animals need to be maintained. In many cases, there is complete lack of responsibility and interest on the part of the manager and veterinarian of an elephant-keeping facility.

Maintenance of employee records and medical details of a mahout/cawadi and their family. This is currently unavailable due to lack of systematic guidelines for elephant-keeping procedures.

Crisis Management

To ascertain and judge the ability of the management to react to emergencies pertaining to the animal/mahout in day-to-day affairs. This is currently ignored due to lack of training and knowledge.

To evaluate medical emergencies related to an elephant. The negligence in treating early symptoms of disease, the lack of veterinary expertise and unavailability of veterinary facilities need to be addressed.

To establish a database of experienced mahout pool. This database is currently unavailable. Unavailability of mahouts due to lack of an established network

is the single-most important reason of elephant suffering and cruelties at the hands of inept handlers.

Introduction

Elephants have been maintained in captivity for a variety of reasons over thousands of years either to be used in battles between kingdoms or for timber-gathering operations. The need for the former does not exist in the present political system in India where there are no kingdoms. Based on compassion or for economic reasons, there is continued existence for elephants in a captive state. The state of Karnataka is home to captive elephants maintained by different management systems, providing a variety of facilities for its animals. Elephants cannot be considered to be domesticated despite their long association with people, (Kurt and Garai, 2007) making it imperative to provide an environment in captivity which does not affect the animal's biological/ social/ecological needs.

Objectives

The existence of varying captive conditions entails that their welfare status is assessed objectively to provide for better well-being of the animals in captivity. Also, the welfare of mahouts/cawadis becomes imperative as they form an integral part of the captive elephant situation. This investigation was initiated to assess the welfare status of captive elephants and their handlers from different management regimes in Karnataka

Method and data-processing protocols

Imposing alien conditions on a non-domesticated, frequently wild caught species of animal has dire consequences on the life of the animal. With this perspective, welfare status of elephants has been assessed based on the deviations experienced in living conditions from that experienced by their wild counterparts. Welfare has been assessed considering the physical environment, social and behavioural features along with availability and access to veterinary personnel and facility. Data was collected (Figure 1a,b,c and d), through observation of animal(s) and interview of

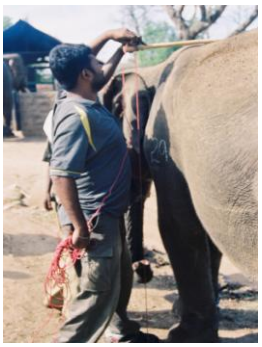


Figure 1a, b, c and d: Data collections through elephant body measurements, direct observations and interactions with keepers

personnel/ Management, representing various aspects of the elephant's life in captivity. The data was grouped into different categories (parameters) based on its identity in terms of physical/social/managerial/physiological relevance to the animal.

Insights on rating

A team of experts wildlife scientists (more specifically experts on elephants), veterinarians, managers (dealing with captive elephants), handlers and welfare activists rated different parameters/sub-parameters of importance to the welfare of captive elephants (Varma, 2008; Varma *et al.*, 2008; Varma and Prasad, 2008). The ratings ranged from 0 (unsuitable) to 10 (suitable) for each parameter and a mean value was estimated for that parameter. Experts used different maxima (with 10 being the limit) for each parameter/sub-parameter based on their concept of importance of a particular parameter to an elephant.

The number of parameters rated by experts was 114; variables which represent a common feature of the captive condition have been grouped to form a parameter. The variables have been termed as sub-parameters. For example, variables shelter type, shelter size, floor type in the shelter namely represents different aspects of the physical space provided to the elephant. Hence, these are grouped together to form the parameter "Shelter" and each constituent variable is the sub-parameter.

Using the experts' rating as a reference, a rating scale was developed for each of the sub-parameters. This scale ranged from 06/ 07/ 08 /09 in relation to the maxima provided by the experts.

While the experts rated only 114 parameters, in some situations, the ground data available exceeded this number. The additional information was crucial and could not be ignored. For example, the parameter "work" did not include such aspects as "work timing". The maxima provided by the experts for "work" was used to develop a scale for the sub-parameter "work timing" as this forms an integral part of the parameter "work".

"Work timing" can have three properties:

a. Early morning + evening hours
b. Early morning + early evening
c. Late morning + early evening

Of these properties, the first is given the maximum provided by the experts for the related feature "work" which is 8.0. This is followed by the second option which gets a rating of 4.0; the third option gets the least rating of zero (0). Thus, the scale for a related and additional parameter will range from 0.0 to 8.0. Following this logic, all additional information (not rated by experts) was rated.

This rating scale, ranging from 0 to the maxima provided by the experts (for example, 8.0) was used to rate the welfare status of the elephants/handlers. The maxima refer to the importance attached to a parameter (with 8.0 as the maximum value, only 2 (20%) deviation from the prescribed norm is acceptable).

Results depicting ratings for each management regime for a particular parameter have been presented in the form of figures. These ratings represent the average across sub-parameters observed within each parameter (referred henceforth as Mean Rating M-R). The figures also include the maximum rating provided by experts for that parameter (referred henceforth as Expert Rating E-R). E-R is the mean across the maxima for all related sub-parameters provided by experts. The results are presented by comparison of M-R and E-R.

For some institutions, the E-R is not uniform as data available was not uniform and it is a function of the data available for rating. Some parameters will not have any relevance for an institution. For a temple-owned elephant, opportunity to range free to browse/graze is usually absent. Hence E-R for this parameter will not be included. Consequently, the E-R for the parameter of interest (for example, food provisioning) may vary from that of other institution, say, Forest Camp (FC). The welfare status of mahouts/handlers has been assessed by looking at socio-economic parameters and the handler's relationship with his animal in terms of experience, knowledge of commands, etc. Bad or poor handler welfare may be associated with poor handling of his animal. Five management regimes were classified based on ownership details provided. Elephants with two management types Zoo and Private Owners have been dealt with in detail by further classifying them based on the facilities provided. This can be accessed in the individual institution reports provided.

Zoo: Bannerghatta Biological Park (BBP), Bangalore, and Sri Chamarajendra Zoological Gardens, Mysore (Mysore Zoo).

Private owners: The Regency Stud Farm (Mysore Palace), Mysore and the Aane-Mane Foundation, Dubare.

Results

Five management regimes were studied, of which 153 elephants were observed and data collected. The distribution of number of elephants across regimes is given in Figure 2. The results show FC elephants score over those owned by temples, zoos, private owners and circuses.

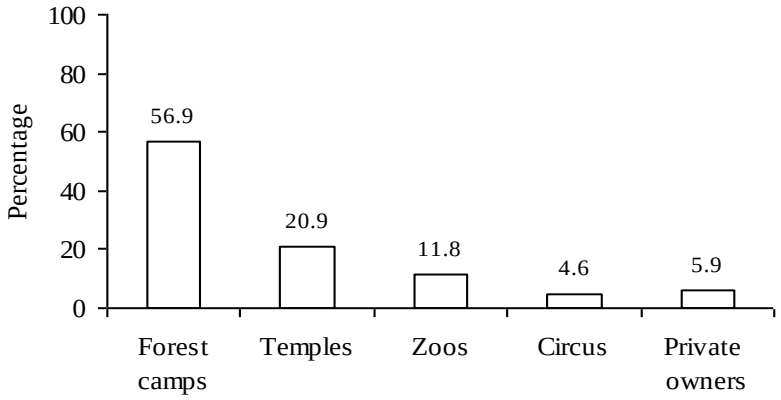
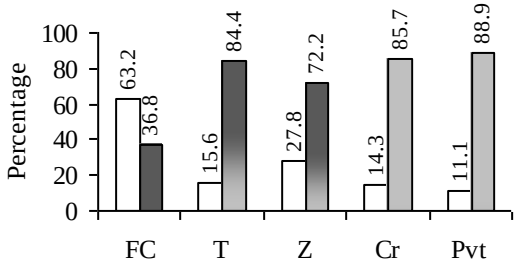
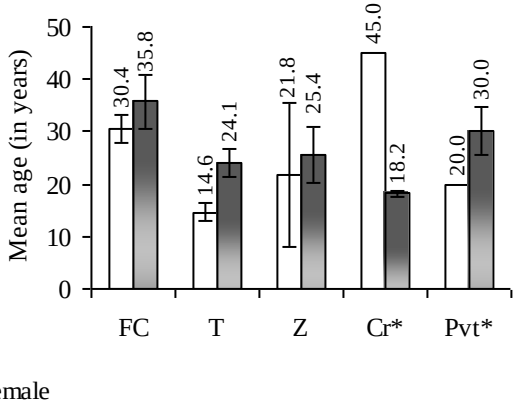


Figure 2: Distribution of sampled elephants across regimes.

Population status

The results suggest that more number of males are being maintained by FCs followed by zoos. Greater numbers of females were seen in the other three regimes (Figure 3). Mean age of the elephants was 28.5 yrs (SE = 1.7, N = 135) with 67 males and 86 females with age ranging from 0.1 to 73 yrs. The age class distribution was biased towards females in all regimes except circus and age of male refers to single elephant maintained by circus (Figure 4)



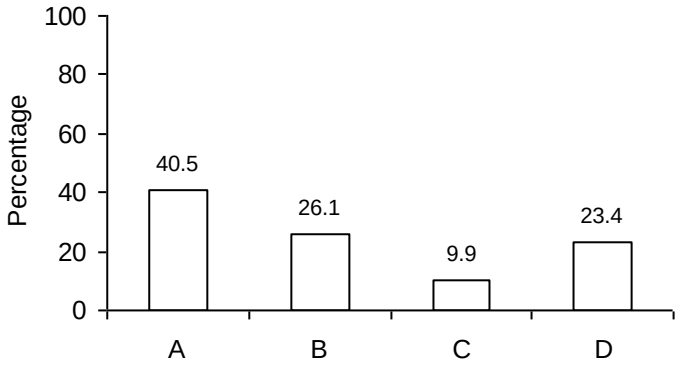


FC: Forest camps T: Temples Z: Zoos Cr: Circuses (single male) Pvt: Private owners (single male)

Figure 3: Sex-based distribution across regimes. Figure 4: Age distribution across regimes.

Source of elephants

Forty-one percent of all the captive elephants were caught in the wild with only 23% being captive born (Figure 5). None of the temples surveyed maintained captive-born elephants; all were purchased/exchanged/gifted; captive-born elephants were reported in FCs, zoos and circus.



A: Wild caught B: Purchased/ gifted/ exchanged C: Rescued/ orphaned D: Captive born

Figure 5: Source of captive elephants for different management regimes of Karnataka state.

Captive-born elephants are given high rating as their adjustment to a captive situation is less drastic than those which are caught from the wild. However, this situation may not be ideal for a captive-born animal kept in an unnatural setting.

Shelter

The physical space, along with relevant features, provided to the elephants ranged from forest areas to man-made structures comprising a boundary wall with sheet cover. High rating indicates the existence of near-natural forest conditions.

- FCs provided near-satisfactory conditions; this could be a consequence of maintaining the elephants in forest areas (Figure 6a) as most parameters were similar to natural, forest conditions with a natural flooring and shade from vegetation.
- Temple elephants were housed within man-made boundary walls with predominantly hard floors (Figure 6b); the M-R is the lowest among the four institutions.
- Zoo elephants were provided both natural vegetated areas with suitable flooring and man-made enclosures with hard substrates such as stone/concrete floors, subject to their daily activity within the zoo for display purposes. This is reflected in the deviation of the M-R from the E-R.
- Elephants with private owners had natural flooring (Figure 6a) with variation observed between the owners regarding shelter type. Mysore Palace elephants were

Figure 6a: Free ranging nature of forest camp and Aane-mane elephants; forest act as shelter for both regimes

Figure 6b: Shelter in temples, man made boundary walls with hard floors

Figure 6c: Shelter and floor provided to elephants in Palace

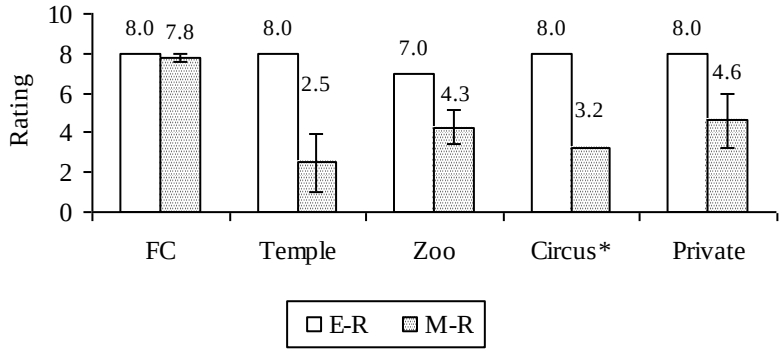
kept on flat mud floors (Figure 6c) while Aane-Mane elephants were kept in forest area. The M-R is similar to that of zoos, with greater variability in the rating of sub-parameters.

- Circus elephants were chained near their tents (Figure 6d) without access to forest areas or natural conditions. This is represented by low rating for the two sub-parameters: Shelter type (2.4) and floor type (4.0) with the E-R being 8.0 for both sub-parameters.

Figure 6d: Shelter provided for elephants in circus

Considering the deviation from E-R for this parameter:

- FCs showed minimum deviation of 3%
- Temple and Circus elephants indicated comparable deviation of 69 and 60%, respectively
- Zoo and Private-owned elephants too showed comparable deviation of 39 and 43%, respectively (Figure 7).



*: Mean across two sub-parameters only

Figure 7: Patterns of rating for shelter for different management regimes.

Water and associated features

Forest camps had access to rivers/streams (Figure 8a) which are considered better sources than stagnant water and provide opportunity in terms of space to perform species typical activities.

Temple elephants had water from taps with only a few elephants having access to rivers among temple-owned animals.

Zoo elephants had access to lake/pond water (Bannerghatta) and tank/tap water (Mysore).

Circus elephants were provided water through buckets which restricts the quantity of water which an elephant can access, along with lack of opportunity of immersing itself in water while bathing.

Mysore Palace elephants had access to tap water (Figure 8b) while Aane-Mane elephants were taken to a river in the forest (Figure 8a).

Figure 8a: River as source of water for forest camp and Aane mane elephants

Figure 8b: Tap or pipe water as source of water for private elephants

Shoshani and Eisenberg (1982) state the need for elephants to drink and bathe at least once a day. Mckay (1973) emphasizes the importance of water sources in elephants' home-range. Added to these observations is the performance of species-typical activities by the elephants: dust-bathing, wallowing and socializing while drinking/bathing. The provision for and access to water sources and routines which replicated near-natural conditions, along with maintenance of health of the animal, was given high rating.

All the observed institutions recorded ratings lower than those recommended, with Forest camps and circuses getting comparable values, with M-R for circus elephants showing greater variation indicating (Figure 9) the existence of diverse conditions.

Percent deviation from E-R was:

- Minimum was observed for FC (21%)
- Maximum deviation was seen in zoos (58%)
- Comparable deviations were indicated for Circus and Private -owned elephants (50 and 49%, respectively)
- Temple elephants showed a deviation of 37%

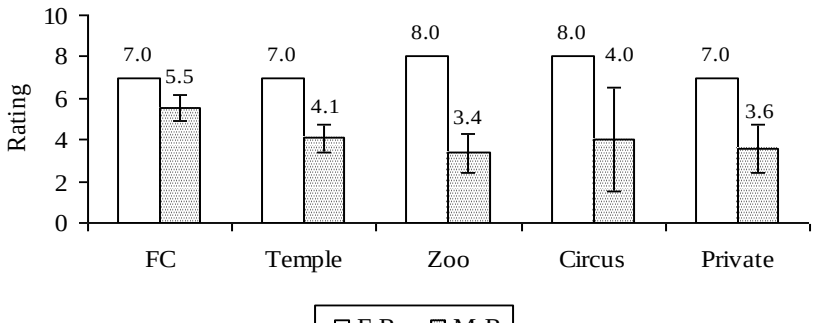


Figure 9 Rating for water and associated features for different management regimes.

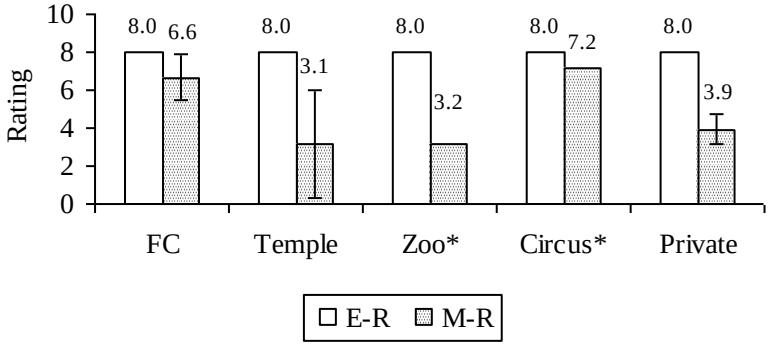
Sleep

- FC elephants were allowed to sleep in forest areas.
- For most temple elephants, the shelter also formed the place of sleep.
- For BBP elephants, the adjoining forest was the sleeping place whereas for the Mysore Zoo elephants it was a man-made enclosure.
- Mysore Palace and circus elephants used the shelter as sleeping place while Aane-mane elephants used the surrounding forest.

The availability of suitable space and duration of sleep was rated across three sub-parameters: place and size of sleeping area and duration. The provision of natural forest areas for elephants ensures suitable sleeping area. When this is considered with the 3 to 4 hours of sleep reported for elephants (Zepelin *et al.*, 2006) high rating reflects the existence of satisfactory conditions. Rating for different systems is presented in Figure 10.

Percent deviation from E-R for different regimes was:

- Minimum was indicated in circus (10%), followed by FC (17%)
- Comparable deviations were observed for temples (61%) and zoos (60%)
- Private-owned elephants indicated a deviation of 51%.



*: Mean across two sub-parameters only.

Figure 10: Rating for sleep for different management regimes.

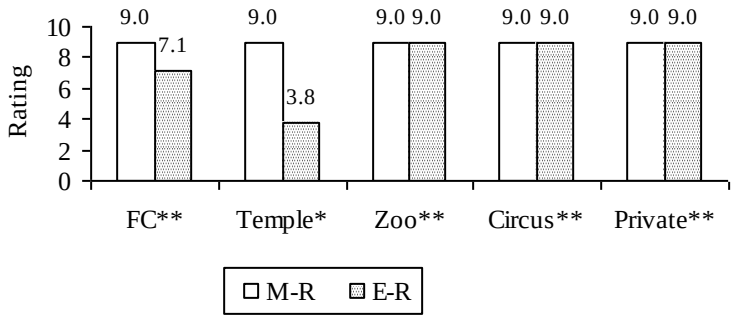
Opportunities for walk

- FC elephants were allowed to walk in surrounding forests.
- Temple elephants were walked on a range of terrains: roads, crop fields, around temples, etc.
- Mysore Zoo elephants were left to walk in the enclosure within the zoo while BBP elephants were left in the surrounding forest.
- Elephants of the circus were walked on tarred roads.
- Mysore Palace elephants were walked within the palace limits, Aane-Mane animals were left in the forest areas.

Wild elephants have been observed to range over several kilometers, being active for most parts of a day (Sukumar, 2003). Keeping this in perspective, opportunities to walk on suitable substrates were rated (Figure 11). It should be noted that the rating for the institutions zoo, circus and private owners reflects "Presence–absence" nature of the sub-parameter only, implying the need for more insight into the feature to provide a closer representation of the existing conditions.

Following deviations from E-R were observed:

- No deviations were observed for zoo, circus and private-owned elephants (only one-sub-parameter was recorded)
- 58% was indicated for temple (two sub-parameters)
- 21% for FC (single sub-parameter)



*: Mean across two sub-parameters only. **Rating for one sub-parameter only.

Figure 11: Rating for walk and related parameters for different management regimes

Social interaction

- FC elephants were allowed to interact (Figure 12a) with con-specifics for durations ranging from 0.2–24 h with number of individuals ranging from 1 to 20, both males and females.
- Nearly 44% of the temple elephants were not allowed any interaction (Figure 12b); of the remaining which interacted did so for less than three hours. Number of individuals consisted of less than four elephants in 94% of the cases.

- Mysore Zoo (Figure 12c) allowed its elephants to interact, except the one male which was segregated; BBP allowed its elephants to interact both in the enclosure and in the forest when left to range free.
- Circus elephants were allowed to interact (Figure 12d) while not working.
- Mysore Palace allowed its elephants to interact when not working; the group composed of predominantly females and a single male; Aane-Mane elephants, consisting of two adult females and one male calf, were allowed to interact without any restrictions.

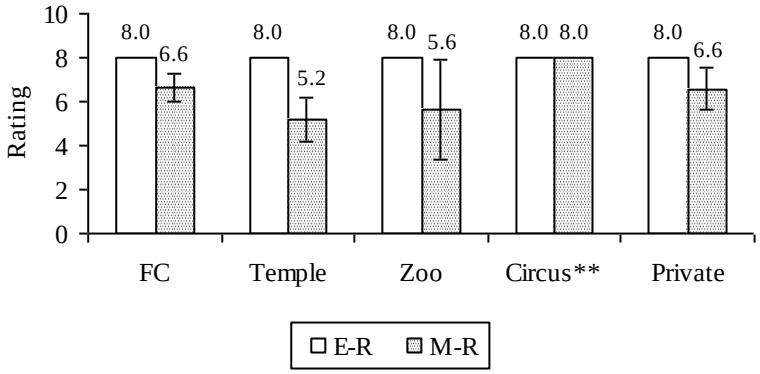
Figure 12 a, b, c d: Scope for social interactions among elephants in forest camps (a), temple (b), zoo (c) and circus (d).

Elephants are social animals, with relationships lasting across generations (Sukumar, 2003). Male elephants too have been observed to disperse gradually from their natal herd (Poole and Moss, 2008). Opportunity for interaction was rated considering group composition, duration and distance between individuals.

Deviation from E-R, expressed as percentage was:

- Circus elephants did not show any deviation, but the rating was based on one sub-parameter only.
- Both FC and private-owned elephants showed comparable deviation of 17 and 18%, respectively.
- Zoo elephants recorded 30% and temple elephants 35% deviation.

Ratings for different management regimes are presented in Figure-13.



*Rating for one sub-parameter only.

Figure 13: Rating for social interaction for different management regimes.

Chaining

- Most elephants in FC were allowed to range free at night in the surrounding forests. However, the animals were tied with drag chain/hobbles during this period.
- All the temple elephants observed were reported to be chained; none of the observed elephants was allowed to range free at night, when not working.
- Mysore Zoo elephants were not allowed to range free at night and were chained by their legs; BBP elephants were left to range free in the forest at night with drag chains.
- None of the circus elephants was allowed to range free, all were chained for more than 20 hours/day with one animal being tied with a spiked leg chain
- Leg chains were used to tie Mysore Palace elephants; Aane-Mane elephants were allowed to range free with a drag chain (Figure 14a, b, c, and d).

Figure 14a: No free ranging, but chained for long hours in temple

Figure 14b: Aane mane elephants returning to the camp after free ranging, note drag

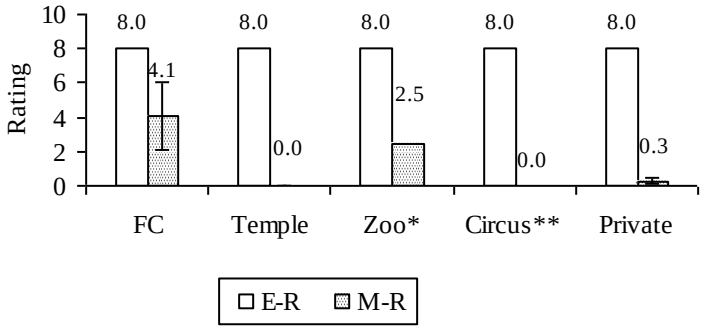
Figure 14c: Chained circus elephant

Figure 14d: Seized spike chain from a private elephant owner

Captive elephants are subjected to various regimens of chaining as a means to control/manage them. This practice can affect the animal by imposition of restriction on movement. Opportunity to range free in forest conditions was considered with high rating to represent occurrence of near-natural conditions of free-ranging behaviour. Rating for different regimes is presented in Figure 15.

Deviations from E-R for different management systems were:

- Maximum deviation was seen in temple elephants (100%).
- Private owner elephants showed a deviation of 97%
- FC elephants show 49% difference
- For regimes with fewer sub-parameters available, the difference from E-R was circus (100%) and Zoo elephants (69%).



**: Rating for one sub-parameter only *: Rating for two sub-parameters only

Figure 15: Rating for chaining in different management regimes.

Observed behaviour

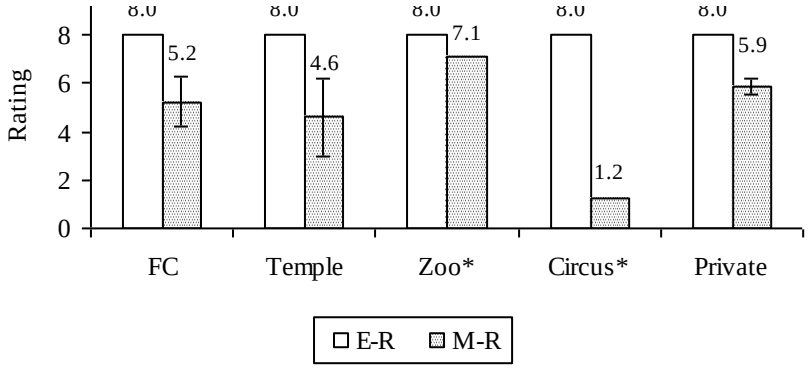
- Seventy-two per cent of FC elephants were described as calm, 82% did not exhibit stereotypy.
- Sixty-nine per cent of temple elephants were described as calm, nearly 70% exhibited stereotypy.
- Eighty-one per cent of zoo elephants were calm and easy to handle with stereotypic behaviour being reported in only one animal.
- All the circus elephants exhibited stereotypy, data on observed temperament was not available hence, conclusion related to temperament cannot be provided.
- Fifty-seven per cent of Mysore Palace elephants expressed stereotypy with all except one animal being described as calm; none of the Aane-mane elephants exhibited stereotypy with one animal being described as nervous.

Captivity imposes a number of conditions on elephants which may find expression in the form of aberrant behaviour (Bradshaw, 2007). The occurrence of stereotypic behaviour, aggression towards people and ease of managing the animal was rated. High rating implies pliable behaviour followed by absence of abnormal behaviour.

Difference from E-R expressed as percentage was as follows:

- Based on rating for two sub-parameters only, circus elephants showed 85% and zoo elephants recorded 11%.
- Temple elephants expressed a deviation of 42%.
- The deviation was 34% for FC and 27% for private-owned elephants.

Different management systems and their respective ratings have been presented in Figure 16.



*: Mean across two sub-parameters only

Figure 16: Rating for behaviour for different management regimes.

Work

- Patrolling/kunki/safari in surrounding forest and occasionally used for timber transportations (Figure 17a) in forest camps and some being used for processions.
- Temple elephants bless devotees, (Figure 17b) offer pooja standing for hours at one place; nearly 80% of elephants seek alms from public and attend temple processions (Figure 17c).
- Both Mysore Zoo and BBP use a few elephants for tourist rides (Figure 17d) in/ around the Zoo. All the circus elephants perform for audience every day for a mean number of three shows.

Figure 17a: Forest camp elephant are also used for occasional loading of logs as work

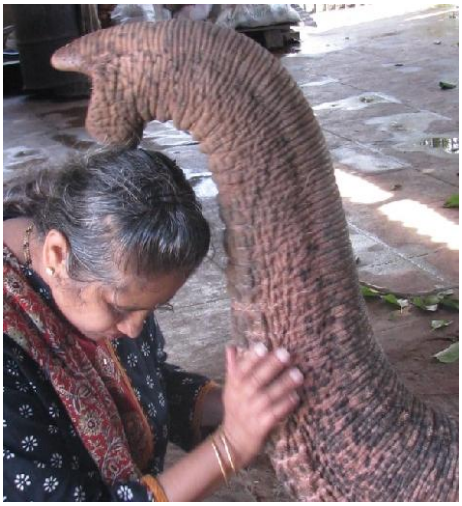


Figure 17b: Temple elephants bless devotees

- Mysore Palace elephants provide rides for tourists within the Palace premises; Aane-mane elephants were not used for any work

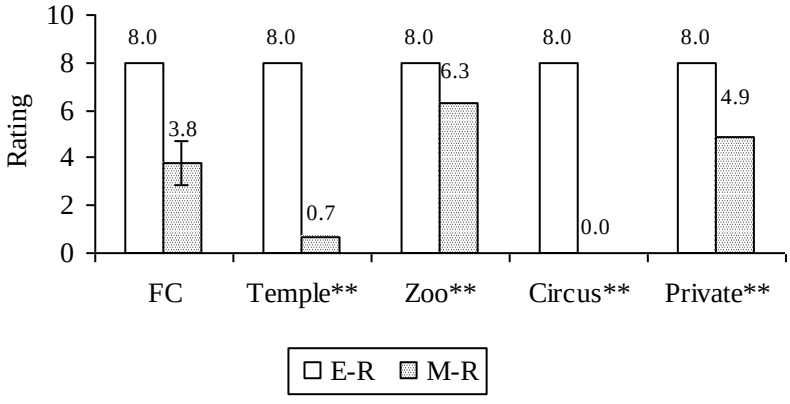
Figure 17c: Temple elephant used in procession

Figure 17d: Private elephants used for tourist rides

The type of work and conditions provided affect welfare of the animal. High rating implies work type and environment similar to that experienced by the animal in the wild: walking in forest areas with limited restriction on movement, access to food/rest and water when needed. The rating for different systems has been present in Figure 18.

Following were the deviations from E-R for different management types:

- FC elephants showed 53% difference
- Based on rating for one sub-parameter only, differences observed were as follows: Circus (100%), Temple (91%), Private (39%) and Zoo (21%).



**: only one sub-parameter considered.

Figure 18: Rating for work in different management regimes.

Food provisioning

- Most elephants (78%) were provided with free-ranging (Figure 19a) opportunity and stall-feed (Figure 19b), in FCs, a quarter of them raided crops.

Figure 19a: Free ranging opportunity for forest camp elephants

Figure 19b: Stall fed FC elephant

- Temple elephants stall fed (Figure 19c) and only 7% of elephants were allowed to range free in temples; most temples did not use a ration chart as a tool to aid in maintaining the elephant's diet.
- Mysore Zoo provided only stall-feed as the elephants were allowed to graze/browse within their enclosure only. Ration charts were used. BBP elephants were given both stall-feed and allowed to range free in the surrounding forest: two animals were reported to have raided crops.
- Only stall feed (Figure 19d) was provided for circus elephants.

Figure 19c: Stall fed temple elephant

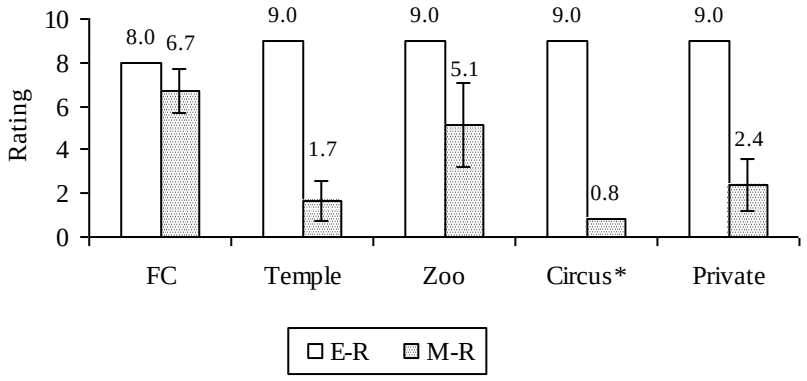
Figure 19d: Stall fed circus elephant

- Mysore Palace elephants were given only stall feed, usage of ration charts was not common; Aane-mane elephants were allowed to graze/browse in the surrounding forests; ration chart was not maintained.

Elephants are known to feed on a number of plants (McKay, 1973; Sukumar, 1991) using different parts of their body to manipulate the food (Kurt and Garai, 2007). Provision of stall-feed only may affect the nutrition content of their food due to limited variety. High rating was designed to represent opportunity to range free to browse/graze along with availability of stall-feed, absence of crop-raiding behaviour along with managerial aspects such as maintenance of ration charts/ hygiene of feeding place. Rating for each regime is present in Figure 20.

Deviation from E-R, expressed as percentage, was as follows:

- Minimum deviation was observed for FC elephants (16%) followed by zoos (43%).
- Temple and private-owned elephants expressed deviations of 82 and 74%, respectively.
- Circus elephants showed a difference of 91% (based on rating for two sub-parameters only).



*: Only two sub-parameters considered

Figure 20: Rating for food for different management regimes.

Reproductive status

Physical health has been associated with normal reproductive functioning (Kurt and Garai, 2007), absence of normal reproductive cycles could also be linked to occurrence of stress (Clubb and Mason, 2002). Reproductive status, refers to available adult elephants in each institution.

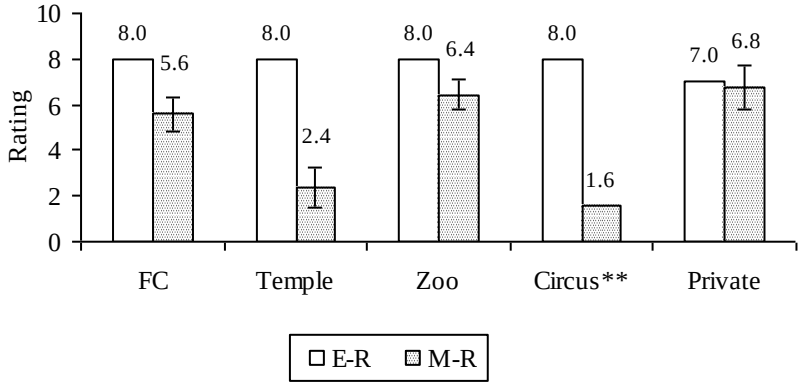
- Most female FC elephants were said to be reproductively active, 81% of the males were said to be active. Most ratings (89%) for individual elephants were in the range of 8–10 implying satisfactory conditions. Seventy-nine per cent of males were said to exhibit musth, with most being isolated/chained during this period
- Fifty-one per cent of observed adult female elephants in temples were not in oestrus cycles, with most females not exposed to males. Two males were reproductively active and were chained during musth.

- Of the observed Mysore Zoo elephants, females were reproductively active having given birth to calves. Among the males, two were reproductively active, with one being chained/isolated during musth. Among the BBP elephants, most female elephants were reproductively active; the single male had not expressed musth symptoms.
- Only one female was reproductively active among circus elephants, having given birth to a calf, the single male in the circus exhibited musth symptoms and had no behavioural problems.
- Among the observed Mysore Palace elephants, three females were reproductively active. Of the Aane-mane elephants both were reproductively active with one giving birth to a calf.

High rating has been given for features of the elephant's living conditions, in the context of reproductive status, and reproductive expression, that replicate the conditions found in the wild to the extent possible. Ratings for different systems have been depicted in Figure 21.

Deviation in E-R was as follows:

- Private-owned elephants showed minimum deviation (3%) followed by zoo (20%).
- FC elephants expressed a difference of 30%.
- Temple elephants indicated a difference of 70%.
- Circus elephants have a deviation of 80%. (based on rating for one sub-parameter only).



**: only one parameter considered.

Figure 21: Rating for reproductive status in different management regimes.

Health status and veterinary routine

Captive elephants are prone to certain diseases/injuries, either unique to captivity or in frequencies less than those in the wild (Kaufman and Martin, in press). For instance, foot problems, excessive weight (Mikota *et al.*, 1994), tuberculosis, exposure to diseases from domestic livestock, etc., are a few health issues.

- Among FCs, stomach disorders and foot injury were seen in greater frequency among the observed animals. More than 90% of the elephants had been de-wormed and oiling was routinely done.
- Eighty per cent of temple elephants had contracted diseases and injuries, with foot problems being observed in higher frequency. Only 24% of the animals were vaccinated and 62% had been de-wormed. Tests on samples of blood/dung/urine were not done.
- All Mysore Zoo elephants were de-wormed/vaccinated/oil applied. Samples of blood/dung/ urine were also tested. BBP elephants were vaccinated, except for one elephant; oiling application was done for all animals.
- Oiling was performed on all Mysore Palace elephants. No disease/injury was reported in Aane-mane elephants.
- Data was insufficient for circus elephants, hence, no conclusions can be derived for this parameter.

Ratings for three management regimes are presented in Figure 22 which suggests that zoos are in a better position in the above aspects; however, the results across zoo and forest camps may not be statistically significant.

Deviation for E-R was as follows:

- Comparable differences were observed in FC and zoo elephants (29 and 22%, respectively).
- Temple elephants indicated a difference of 55%.
- A deviation of 13% was observed for private-owner elephants

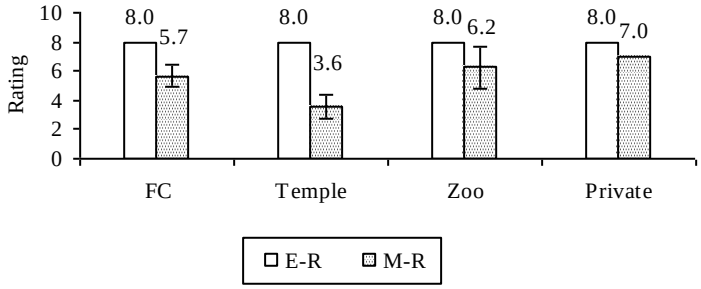


Figure 22: Rating for health status and veterinary routine in different management regimes.

Veterinary personnel and infrastructure

The availability of veterinary personnel and infrastructure relevant to maintaining elephants in captivity may not directly influence the welfare of captive elephants, but the lack of or inadequate infrastructure can affect their welfare indirectly.

- All FC elephants had access to a veterinary doctor, with 98% of them having experience in treating elephants. Veterinary assistants were also available at most

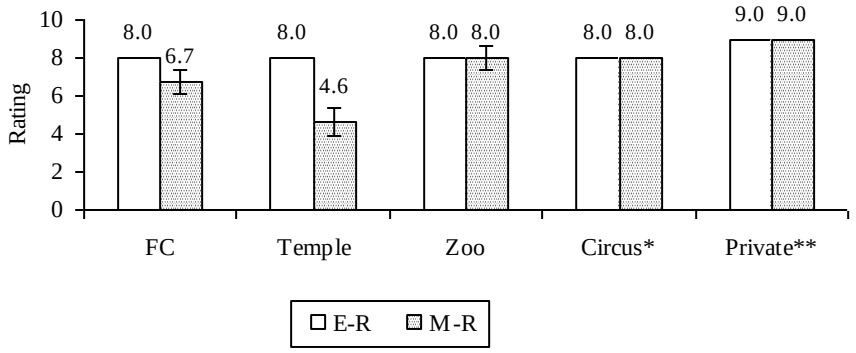
FCs. Facilities of poor to moderate value (implying existence of four to six types of facilities) occurred in FCs.

- Temple elephants also had access to veterinary doctors, 40% (N=15) were said to have had experience with elephants, with over 50% "on call." Most temples did not maintain records.
- Mysore Zoo had the services of veterinary doctors and assistants. The doctor had experience in treating elephants. Records were maintained. Facilities could be categorized as moderate based on the occurrence of five types of facilities available. BBP elephants had access to veterinary doctor, assistants and clinic facility. Records were maintained.
- Scant data was available on circus elephants. The elephants appeared to have access to a veterinary doctor with experience in treating elephants.
- Mysore Palace elephants had access to a doctor with experience in treating elephants. However, veterinary assistants and other infrastructural facilities were absent. Aane-mane elephants had access to veterinary doctor; records were maintained.

Except for temples, the mean rating of all the institutions for this parameter, matches (Figure 23) with that of expert rating; however, the data for circus and private enterprises are based on two or one sub-parameters, and if more parameters are included, the pattern may change.

Differences, expressed as percentage form E-R, were as follows:

- No difference was observed in circus and private-owned elephants (rating based on only two and one sub-parameter respectively).
- Zoos showed no deviation from E-R for the observed parameter.
- FCs recorded a deviation of 16% and temples 42%.



*: Data available for two sub-parameters only (presence–absence type)
**: Data for one sub-parameter only (presence–absence type)

Figure 23: Rating for veterinary personnel and infrastructure.

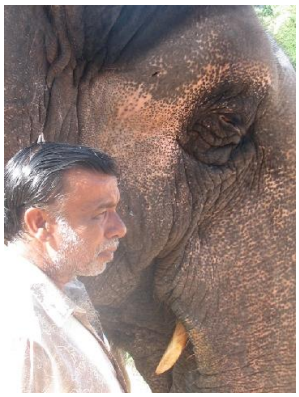
Mahout/cawadi welfare status

The welfare of handlers (mahouts/cawadis) is an important aspect of captive elephant management. Along with this, the handlers' socio economic status; housing (Figure 24a and b) experience in this profession needs to be considered as it directly influences the elephant's welfare.

Figures 24a and b: Examples of the living conditions of elephant keepers

Socio-economic status

Mahout/cawadi Profiles (Figure 25a and 25b) and welfare has been assessed considering his/her socio-economic profile, family history, wages earned and alcohol consumption habit among handlers.



Figures 25a and b: Profiles of mahouts from two different regimes

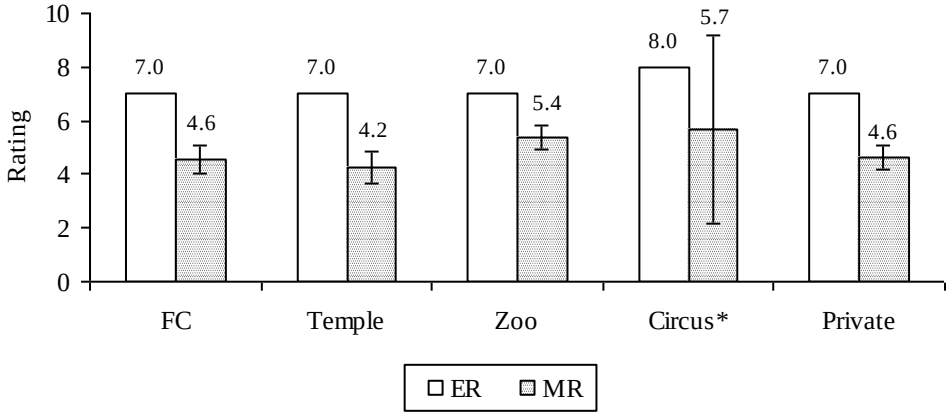
- Seventy percent of FC mahouts/cawadis had handling elephants as a family profession, and an equal percentage were uneducated. The wages of only 33% meet the criteria for satisfaction. Over half of the mahouts were covered by insurance and nearly half of the interviewed mahouts abstained from drinking.
- Of the temple mahouts/cawadis, 53% hailed from families with background in handling elephants, and 44% were uneducated. Only five percent of the handlers were paid wages considered satisfactory. Most mahouts were covered by insurance. One-fourth of interviewed handlers were reported to consume alcohol.
- Most mahouts (66%) working in zoos had a background in handling elephants. All the handlers were educated. The wages of only 8% could be considered satisfactory. Majority of the handlers were covered by insurance (83%) while 90% abstained from drinking.
- None of the circus mahouts was educated. Wages paid and insurance availability was satisfactory for all the handlers.

- 63% of mahouts/cawadis of private-owned elephants belong to families with background in handling of elephants; 22% were uneducated, and the wages of 60% could be considered moderate. More than one-fourth of the handlers were covered by insurance and also consumed alcohol.

Mean and expert ratings for the parameters considered do not match (Figure 26) with each other for any of the management regimes investigated.

Difference from E-R was as follows:

- Both FC and private-owned handlers showed comparable deviation of 35 and 34%, respectively
- Temple handlers expressed a difference of 40%.
- A deviation of 23% was observed for zoo handlers.
- Circus handlers showed a deviation of 29% (rating based on two sub-parameters only).



*: Only three sub-parameters considered.

Figure: 26: Rating for socio-economic status of different management regimes.

Professional experience

- Nearly 25% of FC mahouts had experience in this profession accounting for more than 50% of his age. The same was true for experience with specific elephants.
- Nearly 40% of temple mahouts had experience with elephants with a mean of 20 yrs (ranging from 0.5 to 45 yrs).
- Experience in this profession and with specific elephants was around 25% for zoo mahouts.
- Mean experience in this profession was 12 yrs (ranging from 2–37 yrs) with 33% seem to have been with the same elephant for more than 50% of the elephant's age.

Experience of mahout/cawadi in handling elephants was rated, the mean ratings and expert rating do not match in this case also (Figure 27), and the percentage of match varied from 62 to 67 (mean 64.4, SE = 1.3, N = 4).

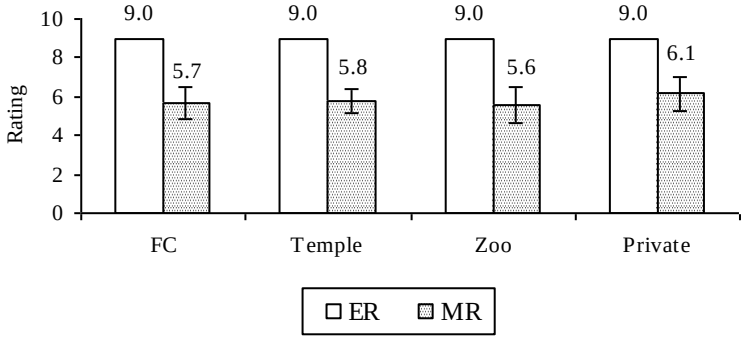


Figure 27: Rating for professional experience in different management regimes.

Overall rating across regimes

While the ratings represent relative state of welfare for each parameter, the elephant in captivity undergoes its situation in its entirety. Hence, an overall rating (Figure 28) has been presented considering all the parameters together, for elephants in each management regime. Among the different regimes, forest camps, zoos and private owners exhibit comparable ratings, with FCs performing better than the rest. Comparatively, low ratings were observed for temples and circus elephants. Deviation from the overall E-R, expressed as percentage, for each regime was:

- Minimum deviation was observed for FC (29%)
- Comparable deviation from E-R was seen in zoo (32%) and private-owned captive elephants (37%)
- Similarly, comparable deviation from E-R was noticed for circus (54%) and temple (59%).

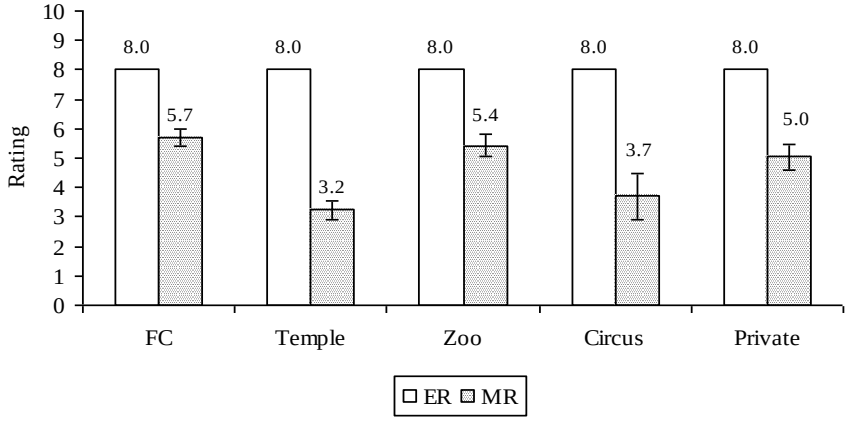


Figure 28: Overall rating across regimes

Discussion

The management of elephants in captivity has to be based on their biology and behavioural ecology (Veasey, 2006). The long lifespan of these social animals, their behavioural repertoire and physical vigour makes it imperative to provide conditions representative of the wild. Deviations experienced in captivity, both biological and physical, from those observed in the wild have been used to rate welfare conditions.

- FC elephants had forest areas along with opportunity to range free in the company of con-specifics has helped provide an extent of near-natural conditions for FC elephants. The proximity of these elephants to forest resources aided in providing the right kind of food, water and shelter.
- Temple elephants were kept in unnatural conditions, in terms of physical space, water and food availability; they are being maintained in isolation as a consequence of chaining or lack of con-specifics. Work performed was also alien to the natural behaviour of the animal.
- Zoo elephants appear to have access to free-ranging behaviour among con-specifics, with constraints imposed due to of lack of space. Additionally, the elephants were chained when they were not on display. However, BBP elephants were allowed to range in forest conditions. Veterinary care and related facility was the best among all the regimes.
- Circus elephants were chained for most parts of a day, having to perform repeated shows every day. There was no provision for suitable water facility/feeding opportunity to range free. The presence of con-specifics did not ensure unrestricted interaction as a consequence of being chained.
- There was much variation in the facilities provided between the two types of private owners surveyed. While Mysore Palace elephants were restricted in their movements to their premises, Aane-mane elephants were allowed to range free in the adjoining forest. Free-ranging opportunity amid natural conditions has helped provide better living and welfare conditions for one of the owners surveyed.

Reference

1. Bradshaw, G.A. (2007). Elephants in captivity: analysis of practice, policy, and the future, Society & Animals: 1-48.
2. Clubb, R. and Mason, G. (2002). A review of the welfare of zoo elephants in Europe: A report commissioned by the RSPCA. Oxford, U.K., University of Oxford, Animal Behaviour Research Group, Department of Zoology.
3. Kaufman, G. and Martin, G. (in press) Chapter 5: Health as an indicator of well-being in captive elephants In: An Elephant in the Room: the Science and Well Being of Elephants in Captivity: 69-73. (Referred online http://www.loudmonks.com/)
4. Kurt, F. and Garai, M.E. (2007). The Asian elephant in captivity—a field study. Foundation books, Cambridge University press, New Delhi.
5. McKay, G.M. (1973). Behavior and Ecology of the Asiatic Elephant in Southeastern Ceylon. Smithsonian Institution Press, City of Washington.
6. Mikota, S.K., Sargent, E.L., and Ranglack, G.S. (1994). Medical management of the elephant. Indira Publishing House, U.S.A.
7. Poole, J.H. and Moss, C.J. (2008). Elephant sociality and complexity The scientific evidence. In: Elephants and ethics toward a morality of coexistence (Eds: Wemmer, C and Christen, C. A) The John Hopkins University Press, Baltimore. (Accessed online:

http://www.elephantvoices.org/index.php?topic=tools&topic2=tools/documents/2_Poole_Moss_Final_7_12_06.pdf).
8. Shoshani, J. and Eisenberg, J.F. (1982). *Elephas maximus*. Mammalian species.182: 1-8.
9. Sukumar, R. (1991). Ecology. In: Eltringham, S.K. (ed.), The Illustrated encyclopaedia of elephants, Salamander Books, U.K.:78–101
10. Sukumar, R. (2003). The living elephants. New York: Oxford University Press.
11. Veasey, J. (2006) Concepts in the care and welfare of captive elephants. Int. Zoo Yb. 40**:** 63–79
12. Zepelin, H., Siegel, J.M. and Tobler, I. (2005). Mammalian Sleep. Accessed online: http://www.npi.ucla.edu/sleepresearch/Mammalian_Sleep.pdf
13. Varma, S. 2008. Identifying and defining welfare parameters for captive elephants and their mahouts in India, In: Welfare Parameters and their Significance for Captive Elephants and their Mahouts in India. (Varma, S. and Prasad, D., Eds.), A joint publication of Project Elephant, Ministry of Environment and Forests (MoEF), Government of India, Compassion Unlimited Plus Action (CUPA) and Asian Nature Conservation Foundation (ANCF), Bangalore, India.
14. Varma, S. and Prasad, D. (2008) Welfare and management of elephants in captivity- insights and recommendations, In: Welfare and management of elephants in Captivity: Proceedings of a Workshop on Welfare Parameters and their Significance for Captive Elephants and their Mahouts in India. (Varma, S. and Prasad, D., Eds.), A joint publication of Project Elephant, Ministry of Environment and Forests (MoEF), Government of India, Compassion Unlimited Plus Action (CUPA) and Asian Nature Conservation Foundation (ANCF), Bangalore, India.
15. Varma, S., Sujatha S.R., van de Brand, J., Ganguly, S. and Shiela R., (2008) Draft concept note on Welfare Parameters and their Significance for Captive Elephants and their Mahouts in India, In: Welfare and management of elephants in Captivity: Proceedings of a Workshop on Welfare Parameters and their Significance for Captive Elephants and their Mahouts in India. (Varma, S. and Prasad, D., Eds.), A joint publication of Project Elephant, Ministry of Environment and Forests (MoEF), Government of India, Compassion Unlimited Plus Action (CUPA) and Asian Nature Conservation Foundation (ANCF), Bangalore, India.

Section 2
Captive elephants in the forest camps of Karnataka State

Executive summary

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1. The festival of joy; celebrated for 10days in some parts of India

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

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

Introduction

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

Objective of the study

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

Method

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

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

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

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

The welfare status of the Forest Camp (FC) elephants was assessed by recording observations for 75 parameters, while 17 parameters each were recorded for the mahout/cawadi. Each parameter has been averaged across the sampled animals and the

mean rating presented. Sub-parameters have been averaged to give the overall mean for that particular parameter.

Results

Population status

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

Source of the elephant

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

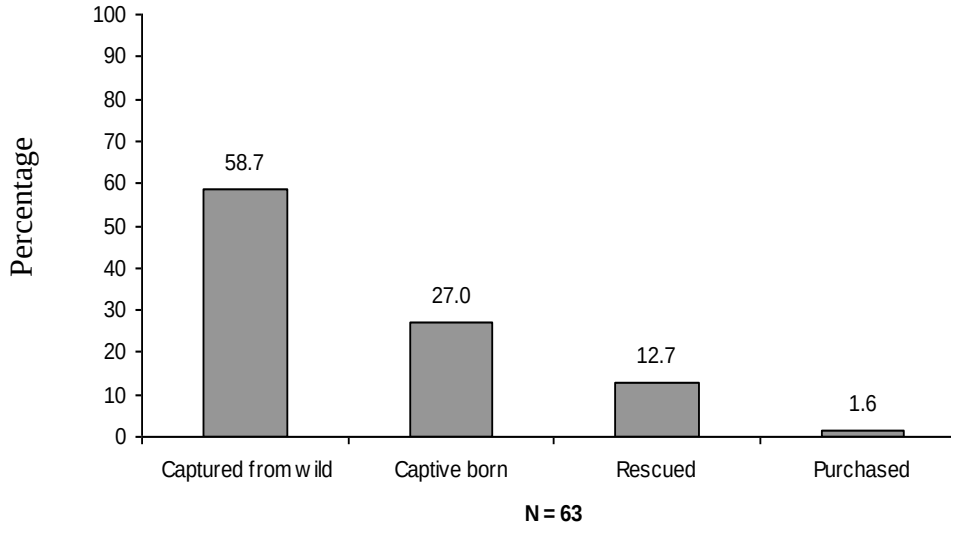


Figure 1: Source of elephants for forest camps in Karnataka

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

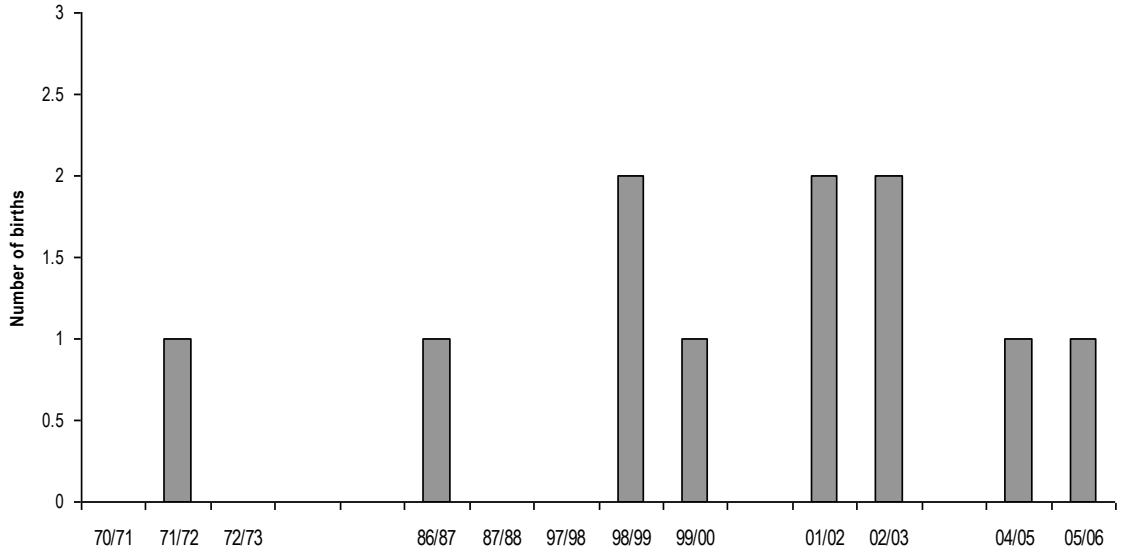


Figure 2: Year–wise number of captive-born elephants for forest camps in Karnataka

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

Type of previous owner

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

Shelter

All the elephants observed belonged to forest camps and hence the forest itself was the shelter. The size of the shelter was thus vast and open. The elephants had earthen flooring, except for 45 yrs, female, which had concrete flooring only during the day. Natural shade of forest trees was available for all the elephants observed, except for Vishnu (male, 37 yrs) which had provision of a tree-shade of size 20 X 20 ft. This parameter was rated using five sub-parameters to include different aspects of the

enclosure. The overall mean for shelter was 9.61 (S.E. = 0.15, N = 5) with mean scores for each elephant ranging from 4.7 to 10 with 89% getting a rating of 10 and none scoring 0. The elephant Gayatri (female, 45y) was given a rating of 4.69 (S.E. = 0.70, N = 4)

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

Floors that replicated natural substrates were given higher scores. Mean rating for floor type was 9.83 (S.E. = 0.02, N = 58) with values ranging from 0 to 10. The floor type for elephant Gayatri (45 yrs, female) was given a rating of 0 indicating substrate to be hard. Availability of shade was given a rating of 10, while non-availability was assigned 0. The mean rating for this parameter was 10 (S.E. = 0, N = 55) indicating provision of shade for all the elephants observed. High rating reflects availability of natural shade under free-ranging conditions. Lower values indicate provision of man-made structures for shade and/ or restricted movement for the elephant. Mean rating for shade type (Figure 3) was 9.12 (S.E. = 0.03, N = 51) with values ranging from 2.5 to 10. Only nine per cent (Figure 4) of the camp elephant scored 2.5 for this parameter indicating restricted movement of the animal along with provision of natural shade (Murkal camp 3, Hebballa 1).

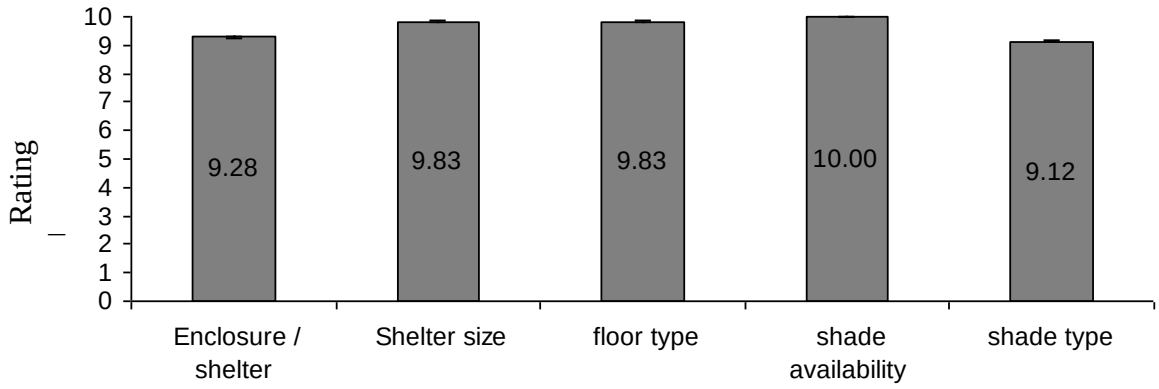


Figure 3: Mean ratings for shelter-related parameter for captive elephants from forest camps of Karnataka

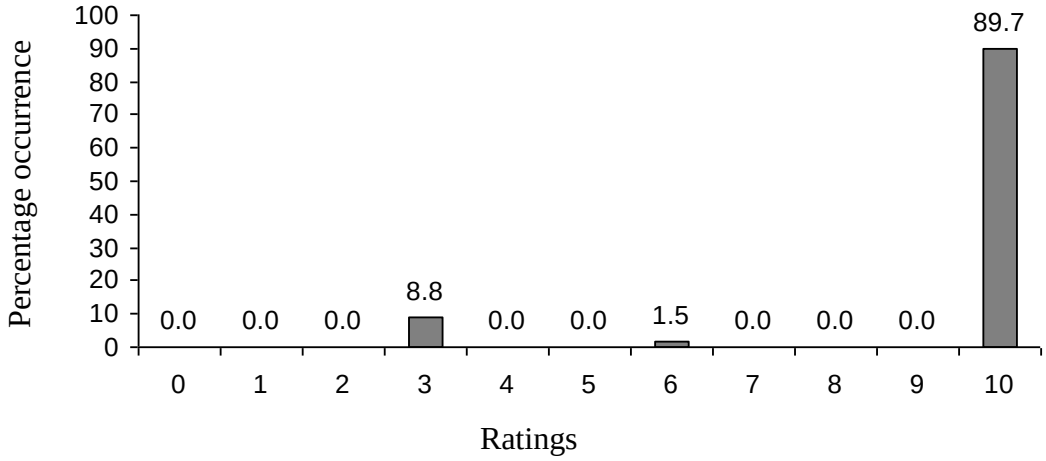


Figure 4: Percentage occurrence of mean ratings for forest camp elephants for shelter in Karnataka.

Water availability and quantity for drinking and bathing

Sources of water for drinking and bathing were varied with rivers/streams (Figure 5) forming 53.25 and 58.97%, respectively, of different sources (N = 78). The elephants were reported to drink 2.4 times per day on average (S.E. = 0.01, N = 69). The mean quantity of water the animals drank was 97 l (S.E = 0.2, N = 55), ranging from 2 to 600 l. Sixty-seven percent of the elephants were reported to drink <100 l of water per day. The mean number of times the elephants were bathed was 1.72 (S.E. = 0.01, N = 57) with minimum size of bathing place recorded being 37.17 sqm. The mean duration of bath was 1.71 h (S.E = 0.01, N = 69) ranging from 0.3 to 4 h. Minimum duration of 10 minute was recorded for the elephant (female, 1 yr). Ninety-six percent of the elephants received <4 h for bath duration (N= 69). Thirty percent of the elephants were bathed using naturally available materials like *Mundakai* (*Pandanus spp*.) or other fibres. Other materials used were brick, brush or stone (N = 70).

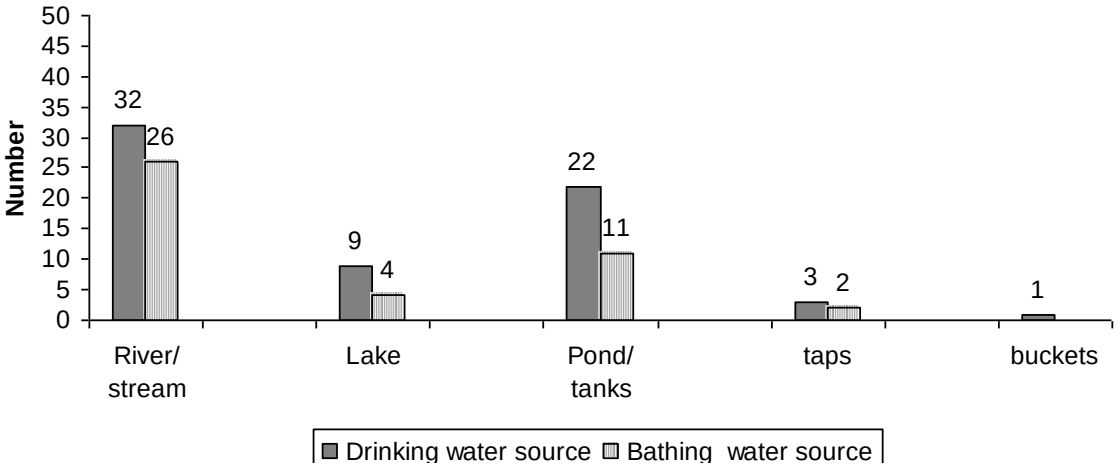
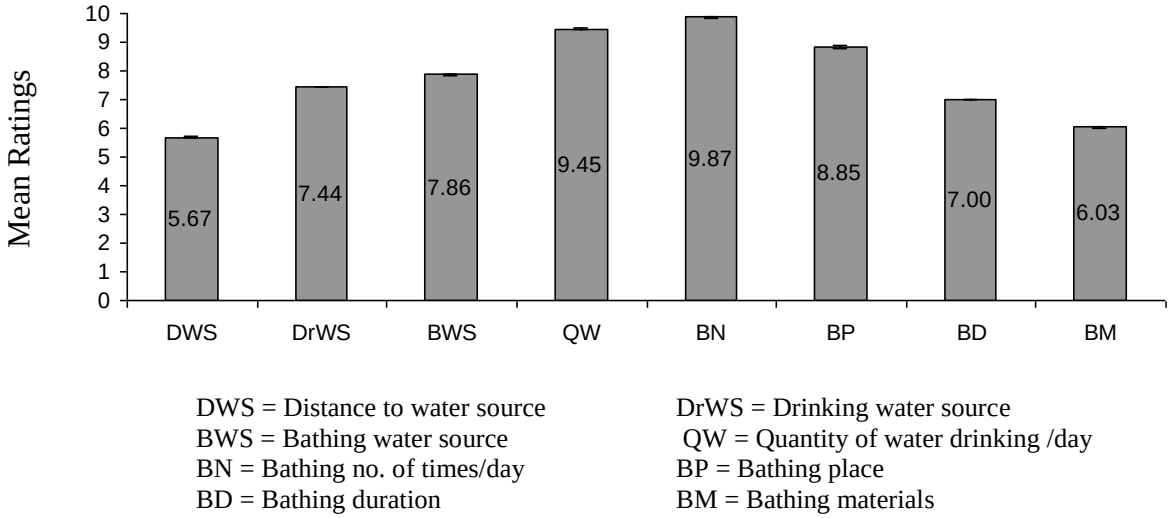


Figure 5: Source of water for captive elephants from forest camps in Karnataka

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



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

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

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

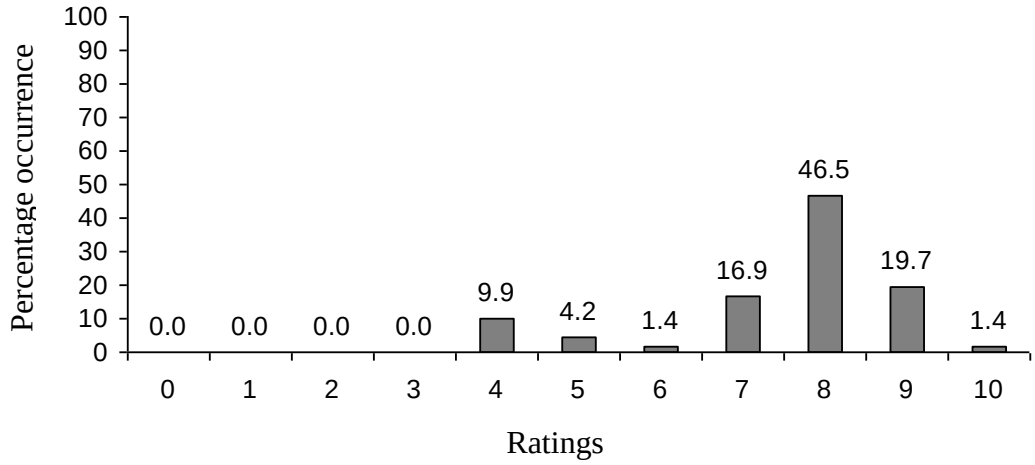


Figure 7: Percentage occurrence of ratings for water-related parameters for forest camp elephants in Karnataka.

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

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

Availability of rest and resting place

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

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

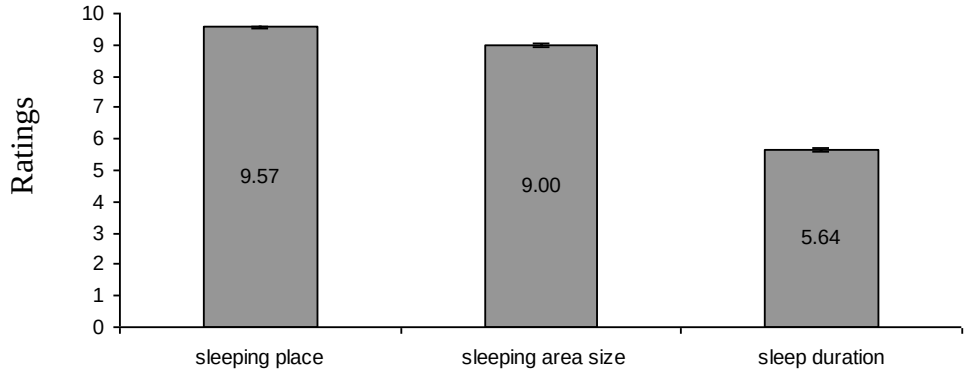


Figure 8: Mean ratings for sleep-related parameter for forest camp elephants of Karnataka

Percentage of mean ratings (Figure 9) for sleep-related parameter dominated for ten values and all values fell within the range of 5 – 10.

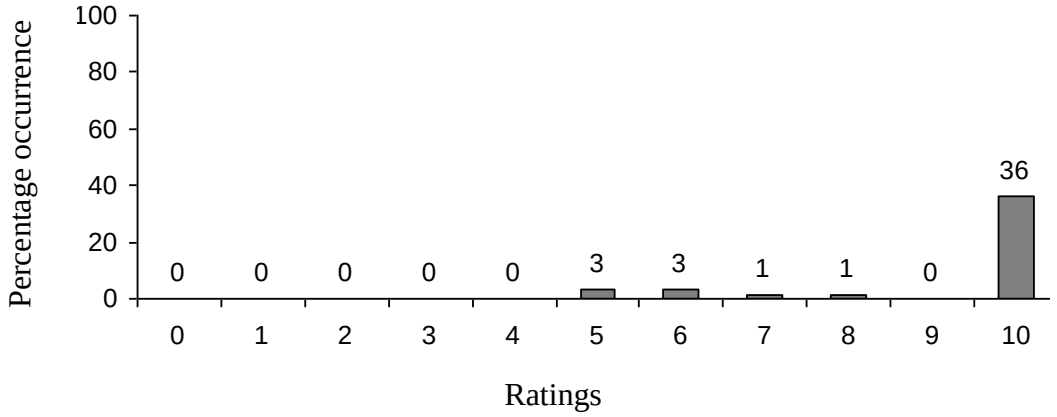


Figure 9: Percentage occurrence of ratings for sleep-related parameters for forest camp elephants of Karnataka

Walk

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

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

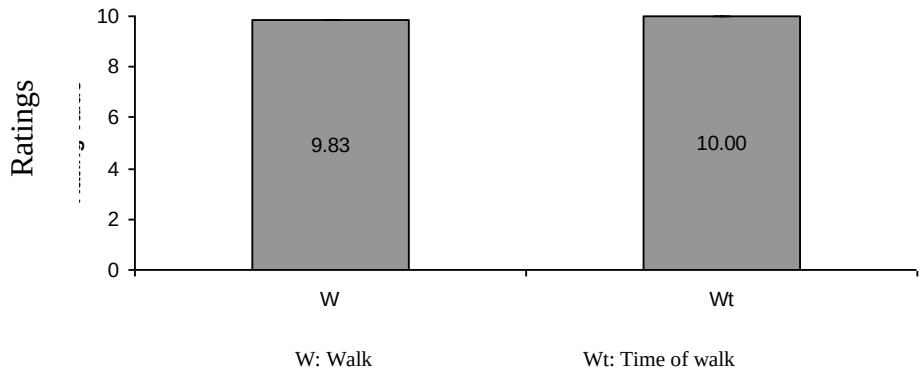


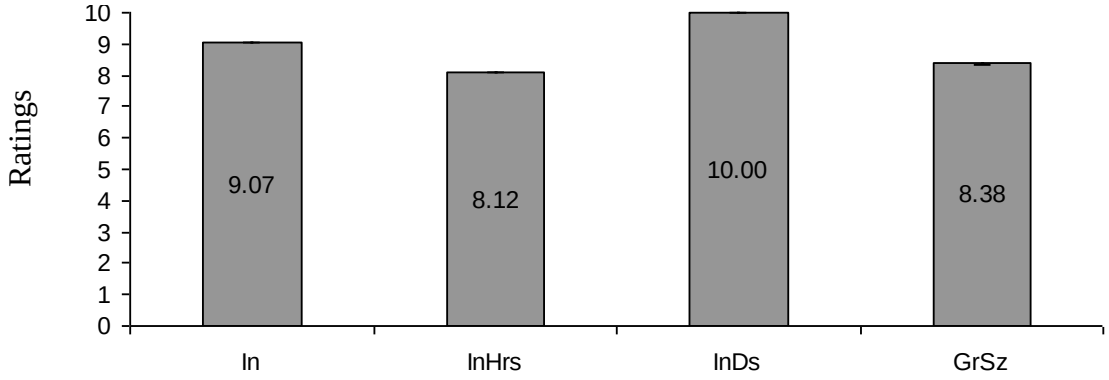
Figure 10: Mean ratings for physical exercise for captive elephants from forest camps of Karnataka.

Interaction with other elephants

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

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

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



In = Occurrence of Interaction with other elephants InHrs = Hours of interaction
InDs = Interaction distance between elephants GrSz = Group size of elephants

Figure 11: Mean ratings for interaction-related parameters for elephants from forest camps of Karnataka

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

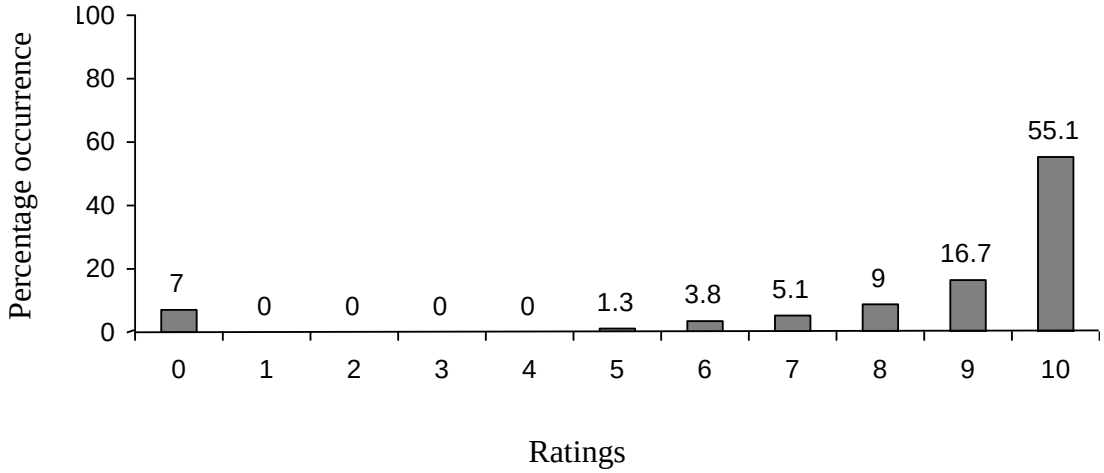


Figure 12: Percentage occurrence of mean ratings for interaction among the elephants from forest camps in Karnataka

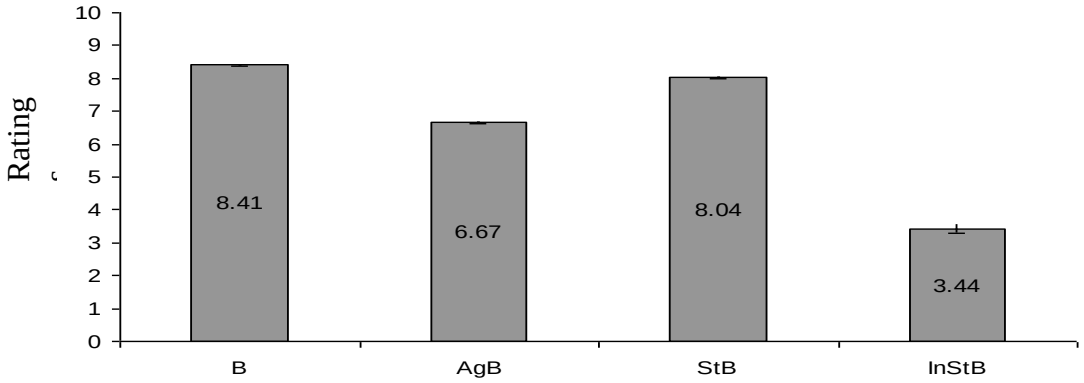
Training

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

Observed behaviour

Seventy two percent of the animals were described as calm while 22% were nervous or frightened (N= 60). One elephant, male, 35 yrs old was reported to be rough.

Observations recorded for behavioural problems such as being rough towards people or incidents of killing people showed 40% of the elephants exhibited this kind of behaviour (N= 33). Eight elephants were reported to have killed or injured people. Eighty two per cent of the elephants do not exhibit stereotypic behaviour, however, three adult females and six males showed stereotypy. Maintenance of animals in captive conditions enforces different living conditions for the animals; at times such conditions might be alien to the animal's natural way of life. This results in abnormal behaviour; stereotypy being one such form and is used to assess the quality of a captive animal's life. Behaviour was assessed using four sub-parameters. Overall mean rating for behaviour-related parameters (Figure 13) was 6.64 (S.E. = 0.5, N = 4) with values ranging from 0 to10 for individual elephants. One male, 14 yrs, was given an overall rating of 0 as the animal gets easily frightened, disobedient and aggressive.



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

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

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

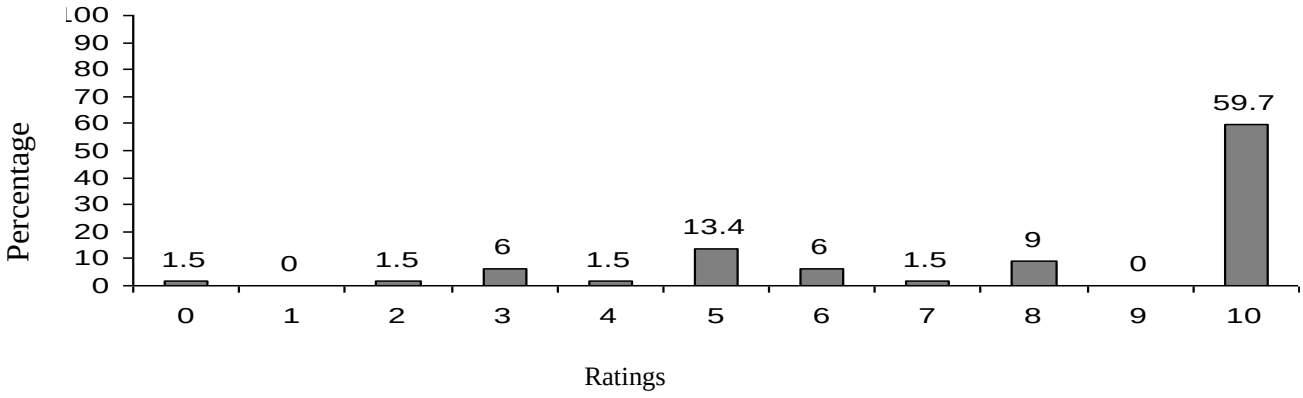


Figure 14: Percentage occurrence of mean ratings for behaviour of forest camp elephants in Karnataka

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

Chaining

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

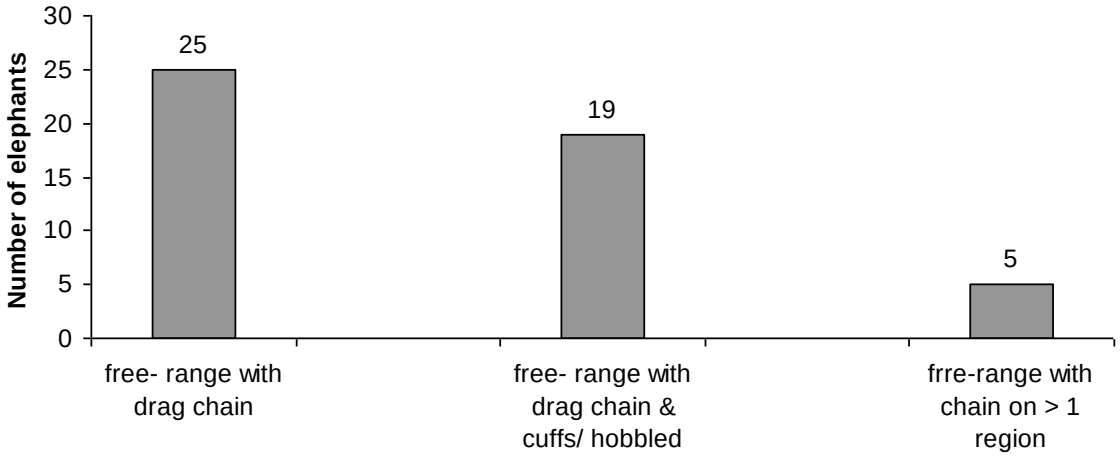


Figure 15: Number of elephants observed with different categories of chain types in forest camps of Karnataka.

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

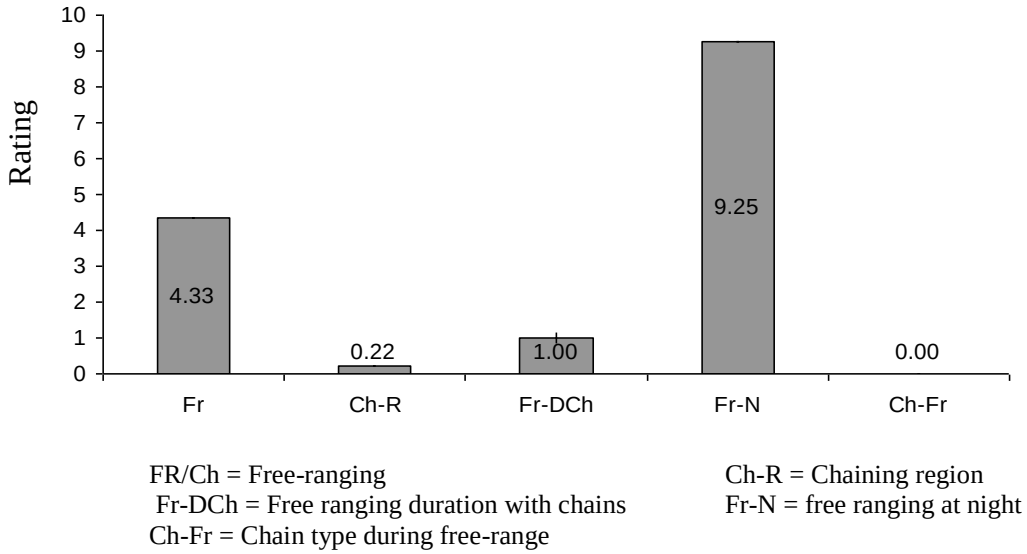


Figure 16: Mean ratings for chain related parameters for forest camp elephants of Karnataka

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

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

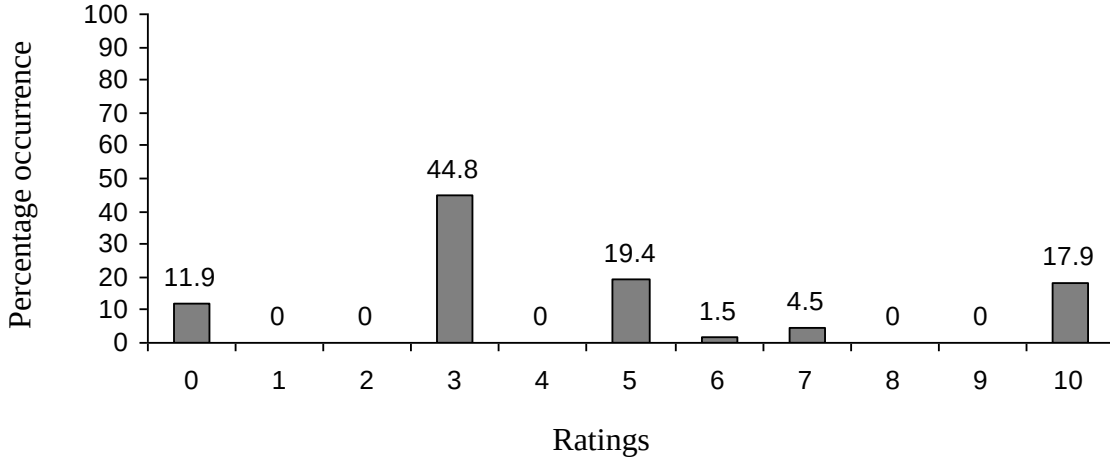


Figure 17: Percentage occurrence of mean ratings for chaining for elephants in forest camps n Karnataka

Nature of work

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

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

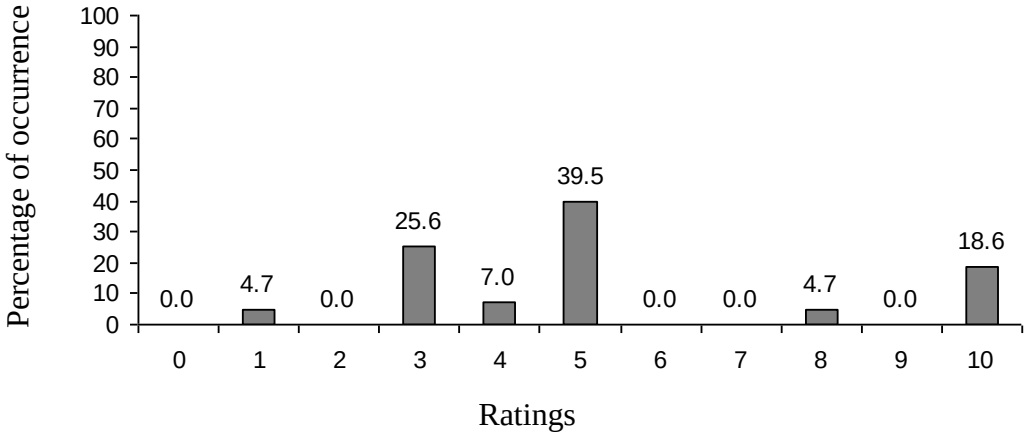
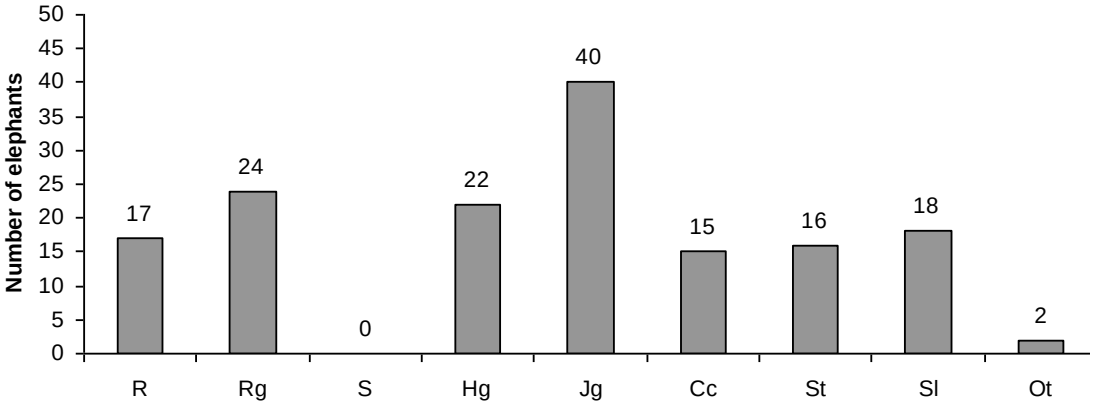


Figure 18: Percentage occurrence of mean ratings for work for captive elephants of forest camps of Karnataka.

Provision of food

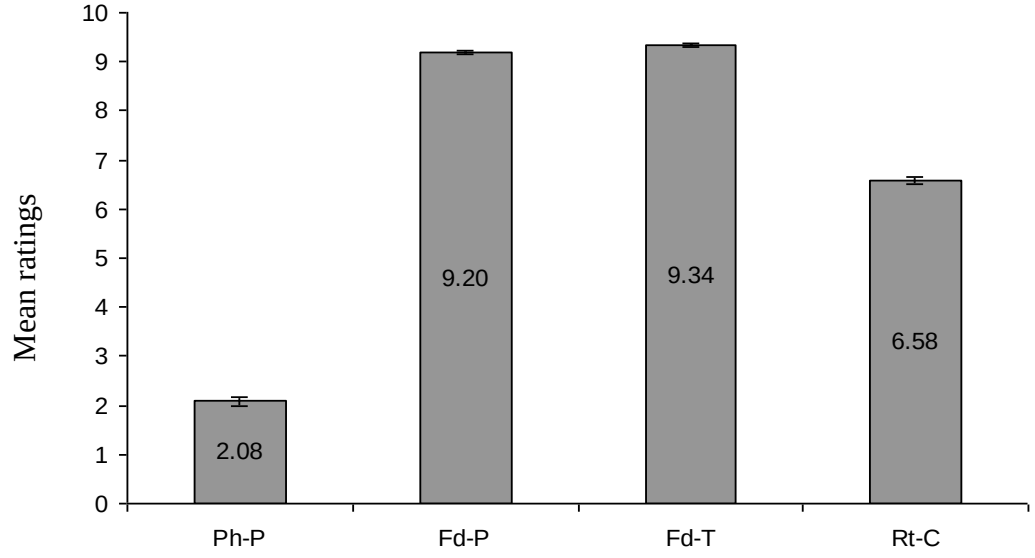
Seventy eight per cent of the elephants were provided both stall-feeding and allowed to range free (N= 51). Among the food provided, jaggery (raw concentrate of sugarcane juice) was the most common (Figure 19) followed by ragi (*Eleusine* sp.), Sixty six per cent of the places reported using a ration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



R = Rice (Kgs) Rg = Ragi (Kg) S = Sugarcane (kg)
Hg = Horsegram/Greengram (kg) J = Jaggery (Kg) Cc = Coconut (number)
St = Paddy straw/ hay/ grass (kg) Sl = Salt (Gms)
Ot = Others (Banyan leaves, Banana, Gevin Beru, Carrots) in kg

Figure 19: Type of food items given to captive elephants in forest camps of Karnataka

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



Ph-P: Alteration of food during physiological changes Fd-P: Type of food provisioning
Fd-T: Food types (number) Rt-C: Usage of ration chart

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

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

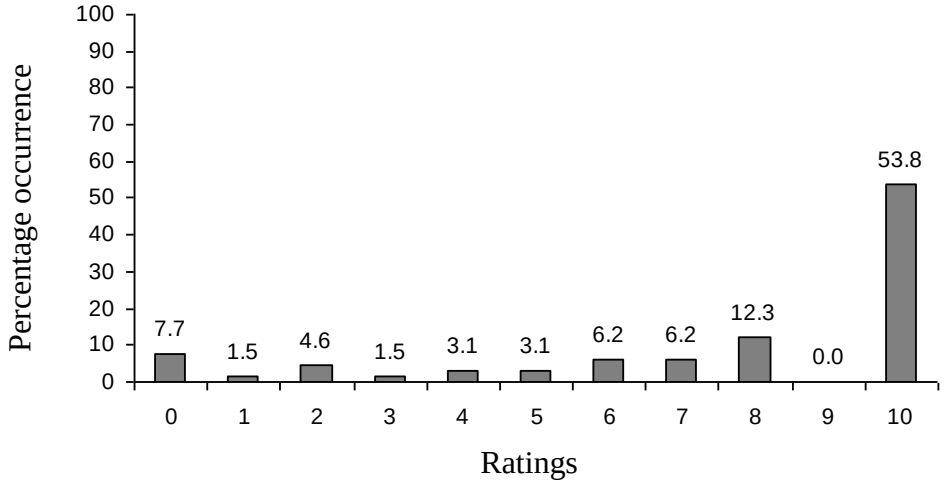


Figure 21: Percentage occurrence of mean ratings for food related parameter for forest camps in Karnataka.

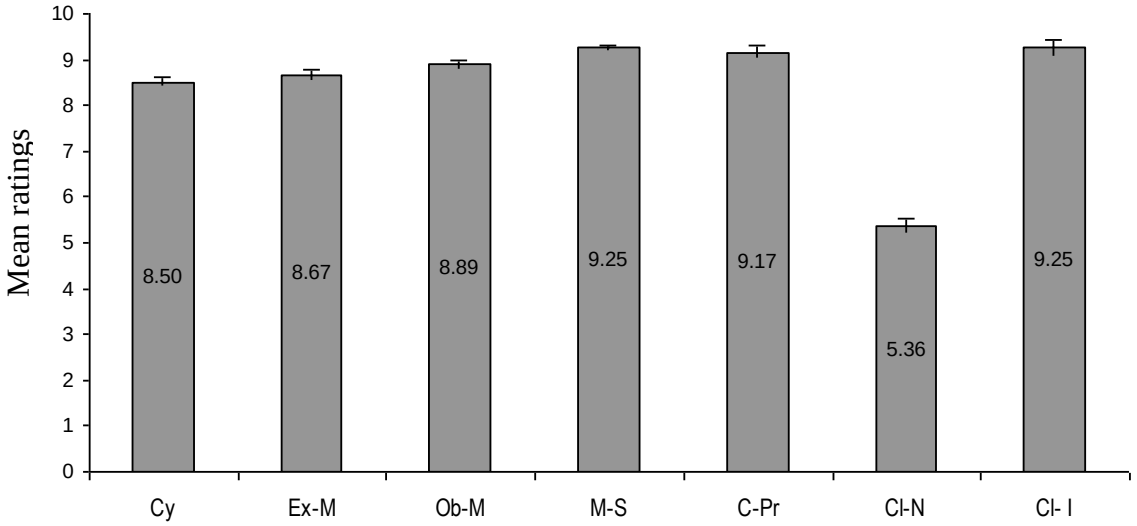
Higher rating was given for elephants which were provided stall feeding and allowed to range free for food. Mean rating was 9.2 (SE = 0.03, N= 50) with values in two categories only: 0 or 10. The rating shows higher incidence of provision of both types of feed. Food which included supplementation of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

Reproductive status

F**emale**

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

reproductive status was 8.44 (SE = 0.20, N = 7) with mean values for individual



elephants ranging from 0 to 10.

Cy: Cycling status
Ex-M: Exposure to male
Ob-M: Observation of mating
M-S: Male source
C- Pr: Presence of cows
Cl- N: No.of calves born
Cl-I: Calving interval

Figure 22: Mean ratings for reproductive status of elephants in forest camps of Karnataka

The results of the percentage occurrence of mean ratings for reproductive status show that 89% of the individual ratings ranged from 7.3 to 10 (Figure 23).

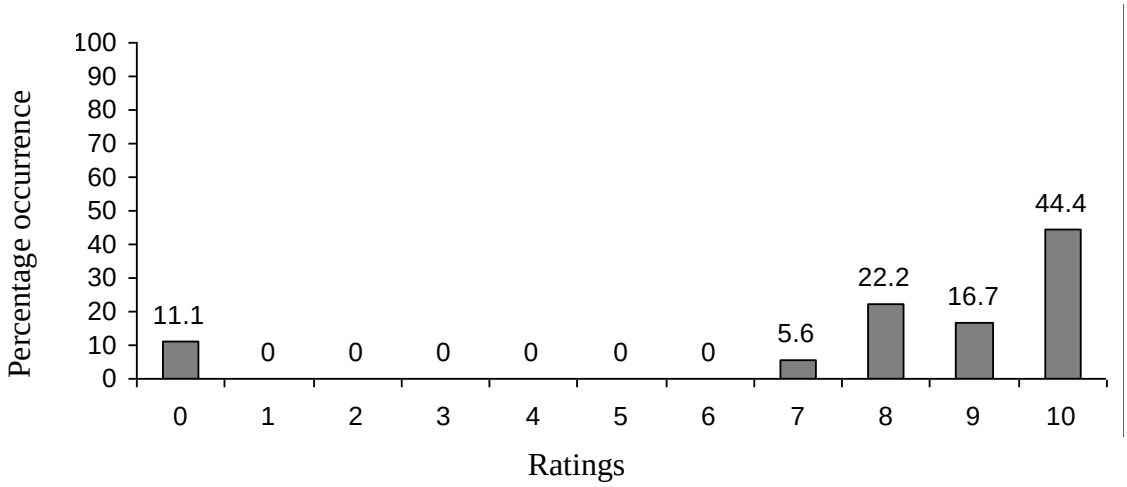
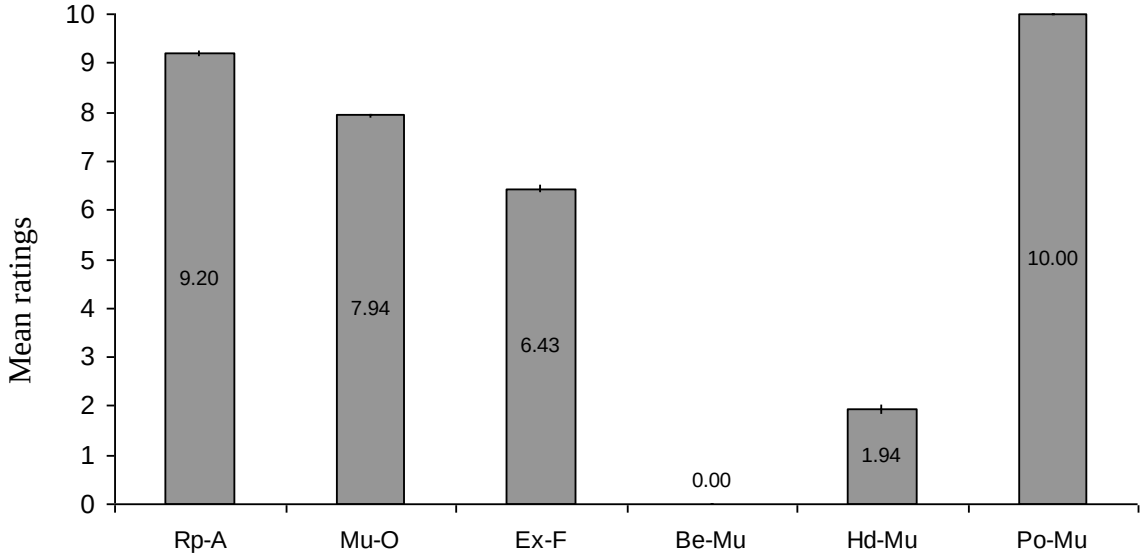


Figure 23: Percentage occurrence of mean ratings for reproductive status of elephants in forest camps of Karnataka

Mean rating for occurrence of heat cycles among the elephants was 8.5 (SE = 0.1, N = 20). This parameter was rated on a 10 and 0 scale only denoting "yes-no" category. Eighty five per cent of the ratings belonged to the "yes" group with a score of 10. Captive female elephants with access to both wild and captive males were given a higher rating. Mean rating was 9.54 (SE = 0.1,N = 13) with twenty three per cent of the elephants reported to have mated with captive males only and the rest with both wild and captive males. Two females were reported to have mated with captive males only. The elephants have been rated by considering their age along with number of births given. Higher rating indicates appropriate number of births within the prescribed age. Mean rating was 5.4 (SE = 0.2, N = 11) with values ranging from 2 to 10. Fifty five per cent of the observed elephants scored less than 5 (between 2 and 4) indicating fewer births. The presence of other female elephants while the pregnant mother delivers has been scored, as it forms an important feature of their natural behaviour. Mean rating was 9.2 (SE = 0.15, N = 12) with values occurring in only one of two categories: Yes = 10 and No = 0. Ninety two per cent of pregnant elephants gave birth in the presence of cows. The only elephant not to have other cows present was of a female 51 yrs.

Male

Male elephants were assessed for reproductive status by rating several sub-parameters (Figure 24) such as reproductively active/not, occurrence of musth, exposure to females, etc. Eighty one per cent of the male elephants observed were reproductively active (N= 21). Musth occurrence was reported in 22 elephants across different months of the year. Eighty six per cent of the elephants in Musth were aggressive/ violent in various degrees. Most used method of controlling elephants in Musth was isolation and chaining (N = 16). Overall mean rating was 5.92 (SE = 0.4, N = 6) with mean values for individual elephants ranging from 0 to 10. Four elephants above 20 years were not reproductively active



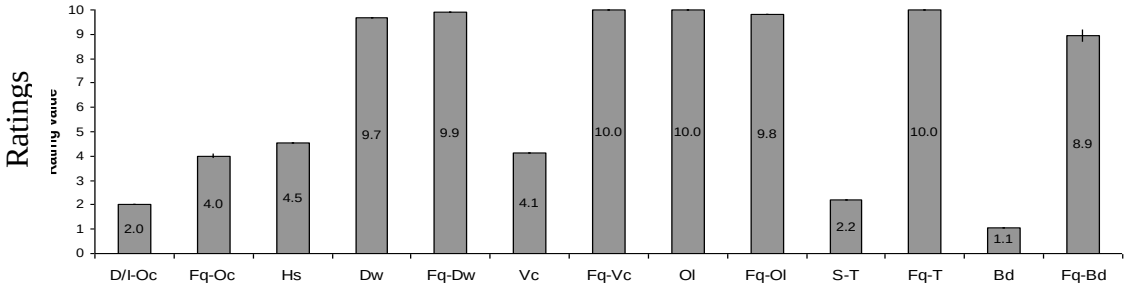
Rp-A: Reproductively active/ not
Mu-O: Musth occurrence
Ex-F: Exposure to females
Be-Mu: Behavioural problems during Musth
Hd-Mu: Handling of Musth elephants
Po-Mu: Post Musth problems

Figure 24: Mean ratings for male reproductive status in forest camps of Karnataka

Mean rating was 9.2 (SE= 0.1, N = 25) indicating near-ideal occurrence of reproductively active males. The rating occurred in only one of two categories (Yes = 10, No = 0) with 92% of the observed elephants reported to be reproductively active. Elephants reported to have exhibited musth signs were given a rating of 10. Mean rating was 7.94 (SE = 0.06, N = 34) with seventy nine per cent occurrence of musth among the observed elephants. Elephants exposed to females were given a higher rating. Mean rating was 6.52 (SE = 0.1, N = 23) with thirty five per cent elephants not exposed to females. Behavioral changes in an elephant during Musth make management of the animal a challenging task. Higher values indicate provision of natural conditions for the animal while low scores denote isolation, chaining or other unnatural conditions. Mean rating was 1.94 (SE = 0.11, N = 18) with seventy eight per cent of elephants in Musth reported to be isolated or chained and three elephants were left free during musth.

Health status

The health of a captive animal assumes greater importance when its correlation with captive conditions is considered. Poor captive conditions, both physical and/or social, may result in ill health among animals. Twenty three elephants were said to have suffered from disease/injury. Stomach related problems such as diarrhoea were common (N = 9). Foot injury was reported in nine of the observed elephants. Ninety five per cent of the observed elephants have been de-wormed at least once (N = 65). Mean number of times each animal was de-wormed was 8.9 (SE = 0.05, N = 54) with allopathic or local medicines.Forty three per cent of the animals have been vaccinated against different diseases at least once (N = 60). Oiling was done for 99% of the animals (N = 74) in the head, leg, and neck or ear region. The oils used were either castor or neem oil. Tests of blood/urine/dung samples were done for 18% of the animals (N = 45). Health status was assessed by rating 13 sub-parameters (Figure 25) such as disease/injury, frequency, nature, adherence to prescribed veterinary schedule, etc. Overall mean for health status was 6.64 (SE = 0.16, N = 13) with mean rating for individual elephants ranging from 0.25 to 10.



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

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

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

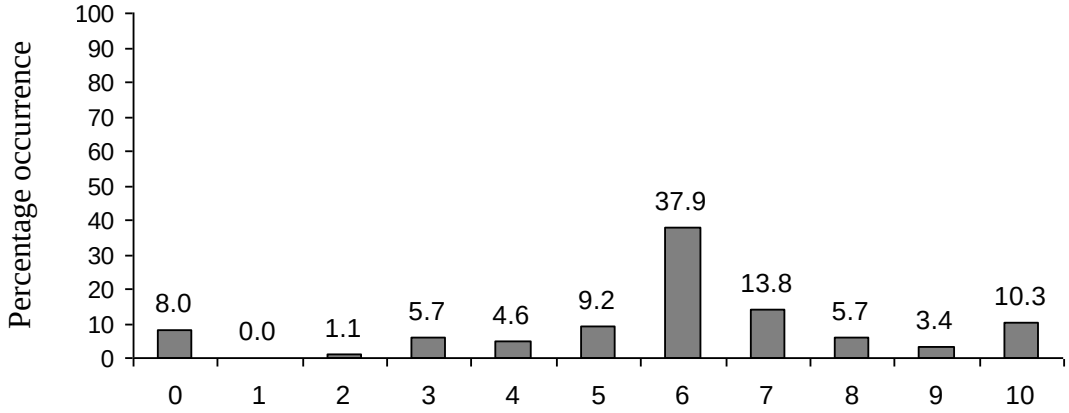


Figure 26: Percentage occurrence of mean ratings for health status of elephants in forest camps of Karnataka

Ratings highlight the importance of disease occurrence as the maximum value assigned for lower frequency of occurrence is 8 and not 10. Mean rating for this sub-parameter was 4.0 (SE = 0.12, N = 20). Fifty per cent of the ratings were given a score of 8 indicating lower frequency of occurrence; the remaining 50% were given a score of 0 and four elephants were given a rating of zero.

Disease/injury type was rated based on whether it could lead to further health problems, whether it was amenable to treatment or caused distress to the animal. When an animal has a disease or injury of chronic nature that cannot be treated, causes pain to the animal, leading to other health problems, it is given a rating of 0. Maximum value of 8 is given to an animal with a disease or injury without any of the above-mentioned features. Mean rating was 4.5 (SE = 0.05, N = 40) with values ranging from 0 to 8. Fifty five per cent were given a rating value less than 3 implying very poor disease/injury status for these animals.

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

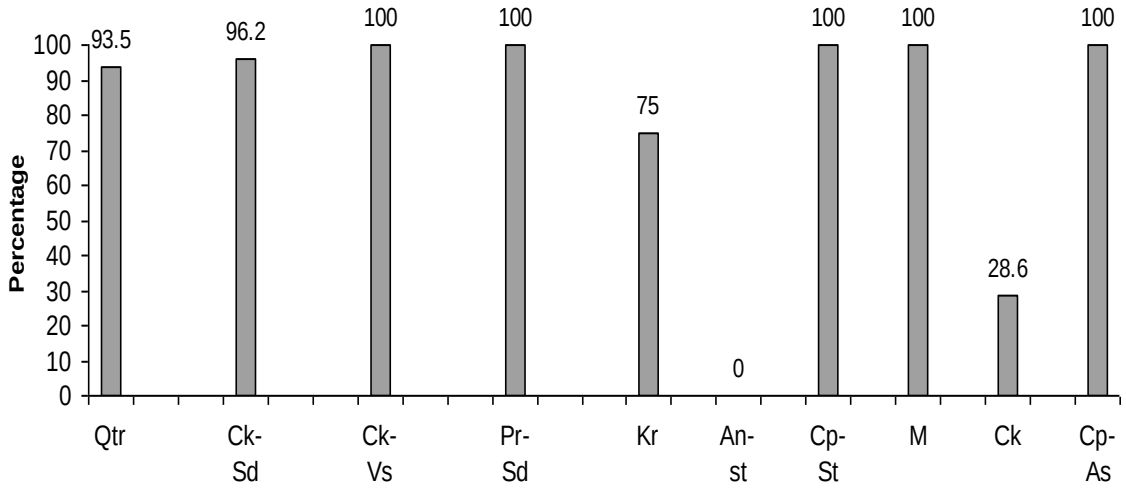
Veterinary care and facilities

Availability of veterinary care and facilities are of utmost importance for the welfare of a captive animal. Veterinary doctors were available for all the animals observed (N = 59) with 98% of the doctors having experience in treating elephants. Daily/weekly visits were the highest (66.7%, N= 45) followed by monthly visits. The mean distance from location

of camp to doctor's place was 95.7 km for situations where the doctor was on call. Eighty six per cent of the camps had the service of a veterinary assistant (N= 28).

Infrastructure

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

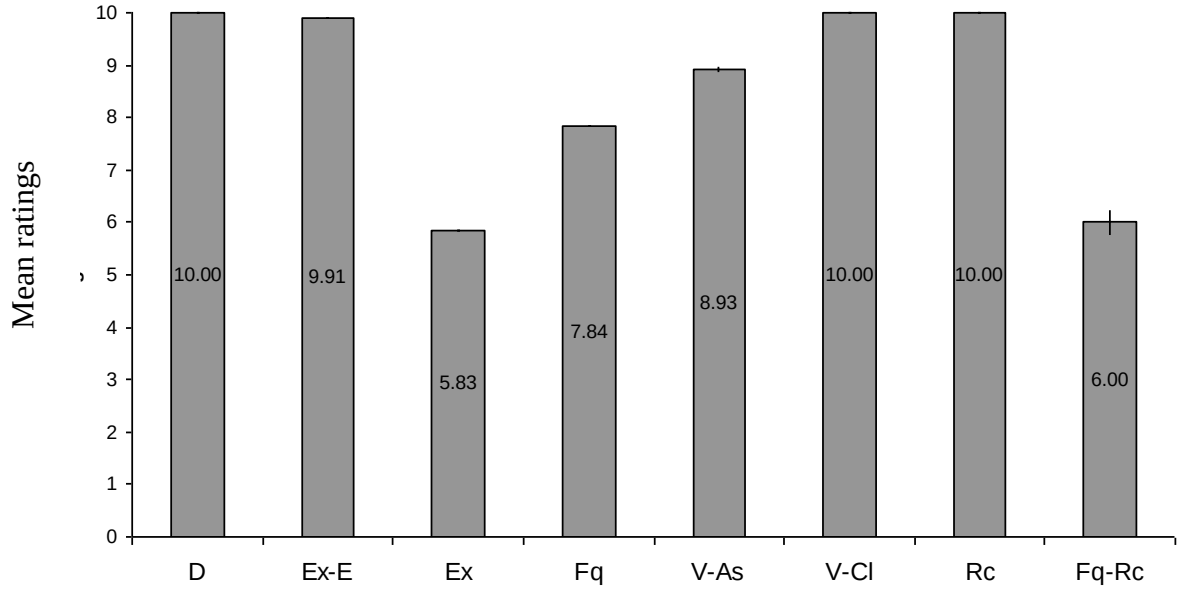


Qtr = Staff quarters available
Ck-Sd = Cooking shed
Ck-Vs = Cooking vessels
Pr-Sd = Provision shed
Kr = Kraals
An–St = Animal stand
Cp-St = Camp site
M = Manager
Ck = Cook
Cp-As = Camp assistant

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

The funds required annually for maintaining an animal was said to be between Rs. 40,000 and Rs 4, 00,000. Of the four observations, three reported problems were associated with funds. This parameter (veterinary care and infrastructure) was assessed using eight sub-parameters (Figure 28) such as availability of veterinary doctor, doctor's experience with elephants, years of experience, availability of veterinary assistant, etc.

Overall mean rating was 8.56 (SE = 0.19, N = 8) with ratings for individual elephants ranging from 6.8 to 10.



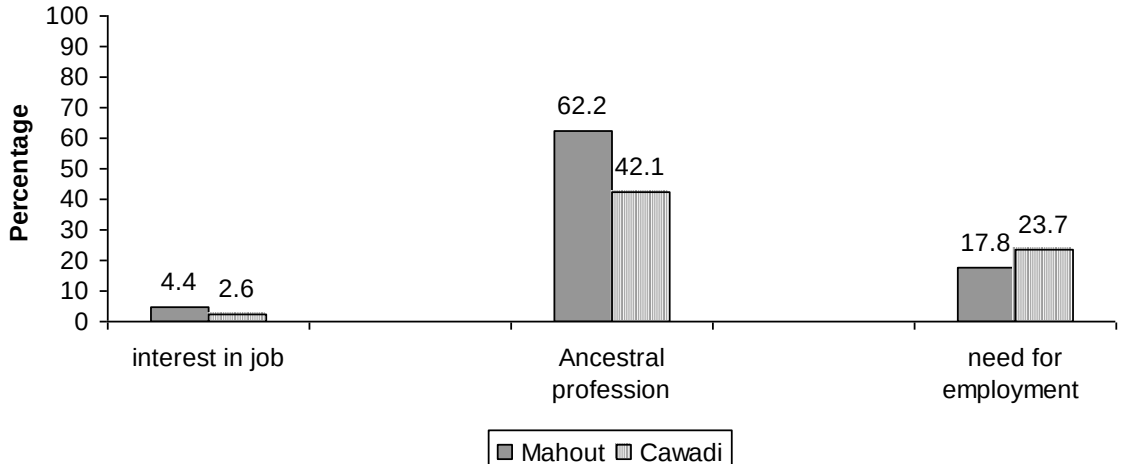
D: Availability of Vet. Doctor | Ex-E: Vet.'s elephant experience | Ex: Vet's years of experience
Fq: Freq. of Vet's visits | V-As: Availability of Vet. Assistant | V-Cl: Vet. Clinic availability
Rc: Record keeping | Fq-Rc: Freq. of record maintenance

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

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

Mahout/cawadi welfare status and work experience

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



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

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

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

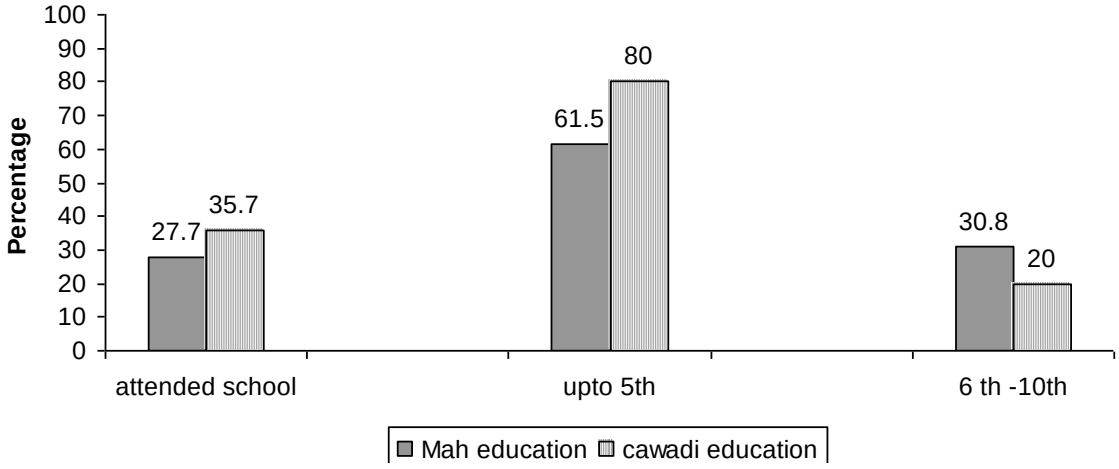


Figure 30: Educational status of mahout and cawadi in forest camps of Karnataka.

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

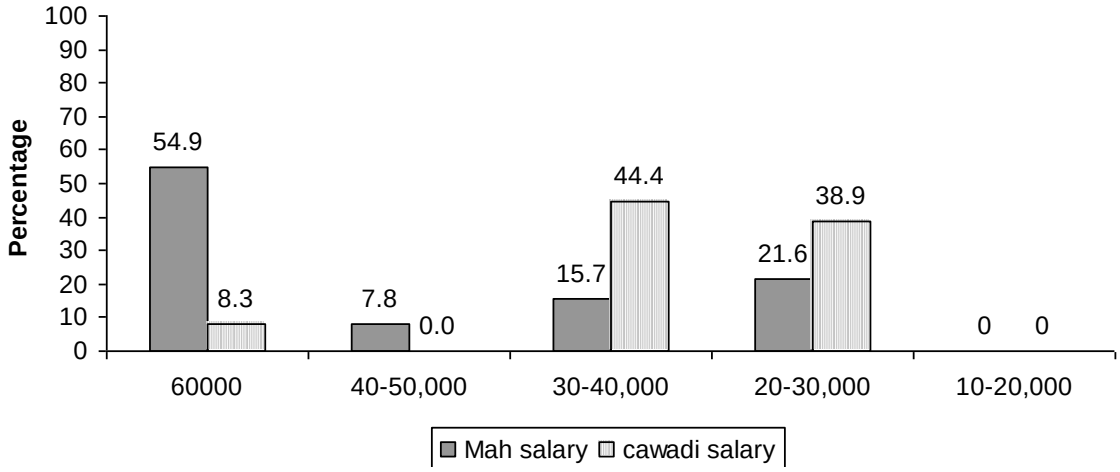


Figure 31: Mahout and cawadi salary status in forest camps of Karnataka

Sixty percent of the mahouts had permanent jobs (N= 50) and the same for cawadis was18%(N= 39). Ninety six per cent of the mahouts were married (N = 51) with a mean number of 2.7 children (SE = 0.03, N = 48). Eighty nine per cent of the cawadis were married (N= 37) with a mean number of 2.1 children (SE = 0.04, N = 29). Eighty four per cent of mahouts had access to accommodation (N= 51, Figure 32), while the same was 76% for cawadis (N= 37).

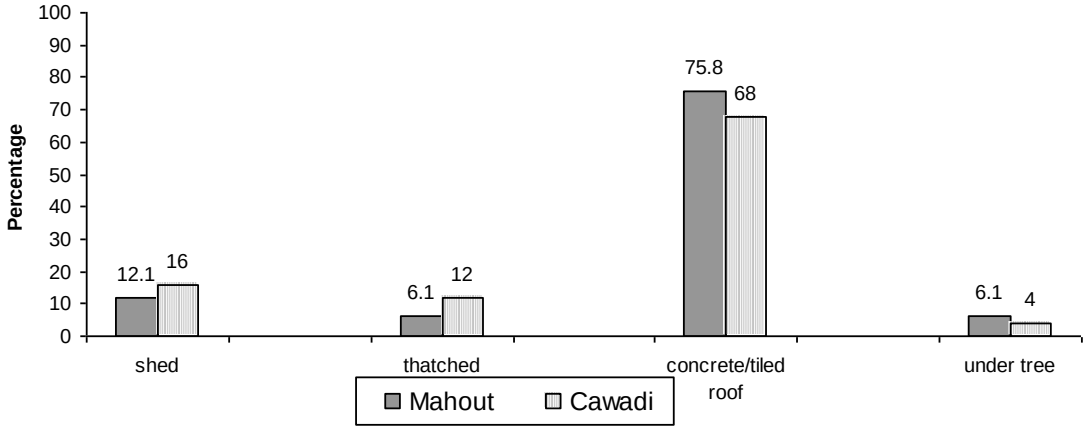


Figure 32: Accommodation types for mahouts and cawadi in forest camps of Karnataka

Ninety six per cent of the mahouts were said to use tools (Figure 33) to control their elephants (N= 47), while it was 100% among cawadis (N= 28).

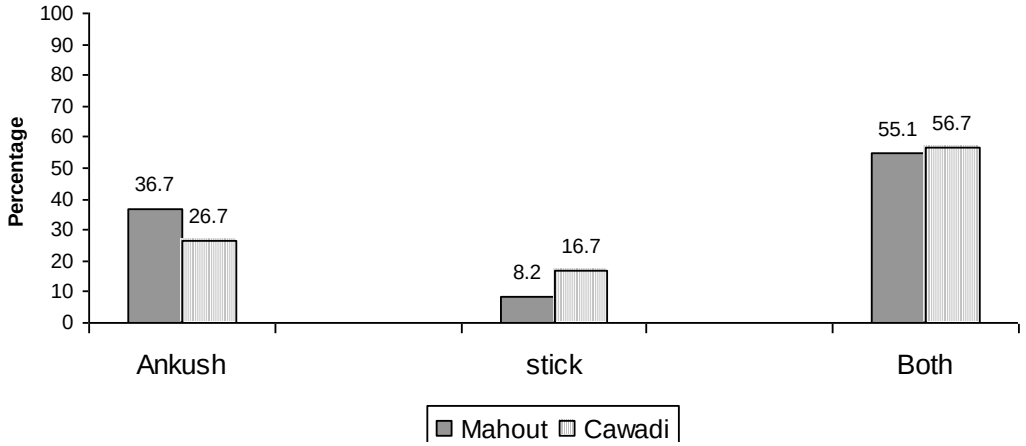
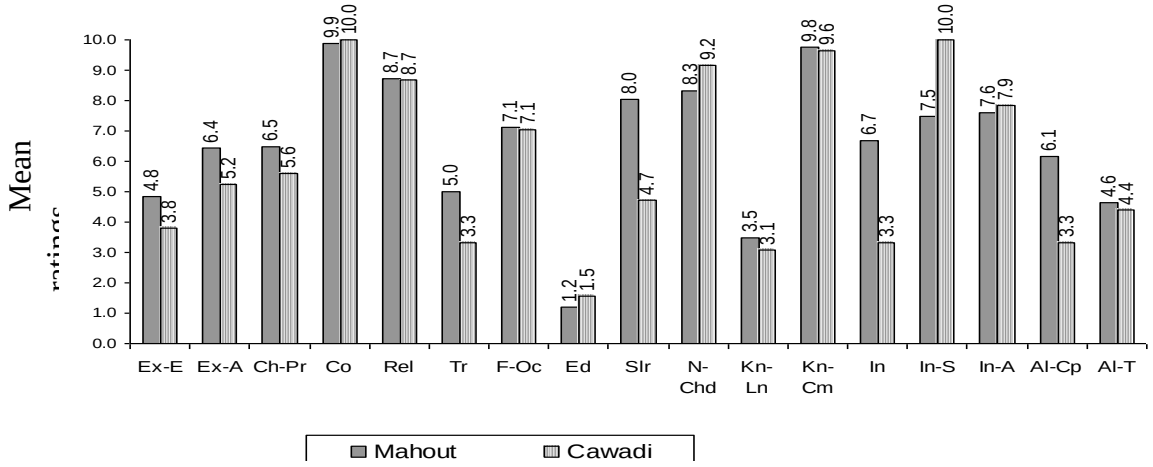


Figure 33: Type of tools used by mahouts and cawadi to control elephants in forest camps of Karnataka.

Welfare of the elephant is indirectly affected by the welfare of its handlers, the mahout and the cawadi. Hence, their socio-economic conditions were recorded and rated. Also, aspects such as experience as a mahout, whether trained or not, etc. were rated. The ratings were on a scale of 0 to 10, with 0 representing adverse conditions and 10 the best possible status for the mahout/cawadi. For example, if a mahout/cawadi's salary is more than or equal to Rs.60, 000/- per year, he gets a rating of 10. The rating reduces as the salary decreases with a wage of Rs.10, 000 to 20,000/- per year getting a rating of 2. Welfare status and work experience of mahout and cawadi were assessed across 17 parameters (Figure 34) each.



Ex-E = Experience as % of elephant's age
Ex-A = Experience as % of age
Ch-Pr = Reason for choosing this profession
Co = Community of mahout/cawadi
Rel = Having mahout/cawadi as relatives
Tr = Trained as mahout/cawadi
F-Oc = Family occupation
Ed = Education
Slr = Salary
N Chd = No. of children
Kn-L= Languages known
Kn-Cm = Knowledge of commands
In = Insurance done
In-A =Amount insured for
Al-Cp = Consuming alcohol
Al-T= Timings of consumption

Figure 34: Mean ratings for mahout and cawadi welfare parameters

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

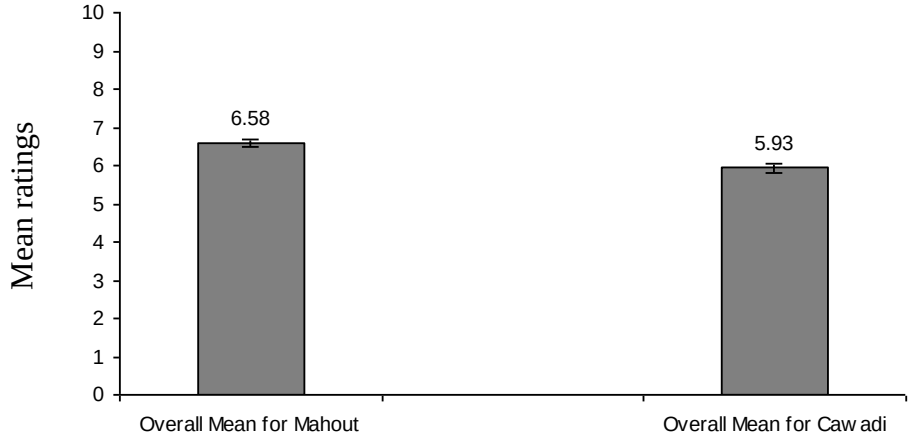


Figure 35: Overall mean ratings for mahout and cawadi in forest camps of Karnataka

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

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

Handling elephants can be dangerous for the mahout/cawadi as unforeseen situations may result in injury or death of the handler when the animal becomes uncontrollable. In this context, insurance cover for the person provides a degree of security for the mahout/cawadi's family. Mean rating for mahout was 6.7 (SE = 0.05, N = 48) with 67% having insurance coverage. For cawadi, the mean was 3.33 (SE = 0.07, N = 33) with only 33% having insurance cover. Alcohol consumption is a practice deleterious to the handler. Mean rating for mahout was 6.2 (SE = 0.05, N = 48) with 60% not consuming

alcohol; in the case of cawadi, the mean was 3.33 (SE = 0.07, N = 33) with 33% seem to abstain.

Comparison of rating between elephants and mahout/cawadi

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

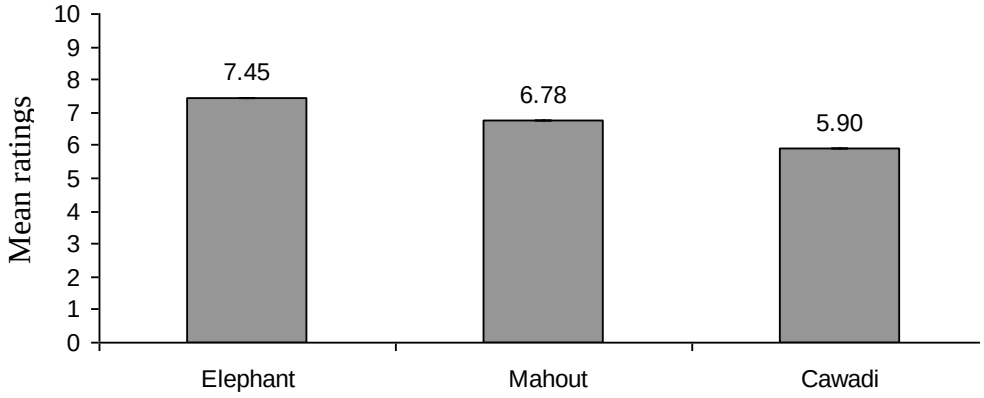


Figure 36: Overall mean ratings for elephant, mahout and cawadi

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

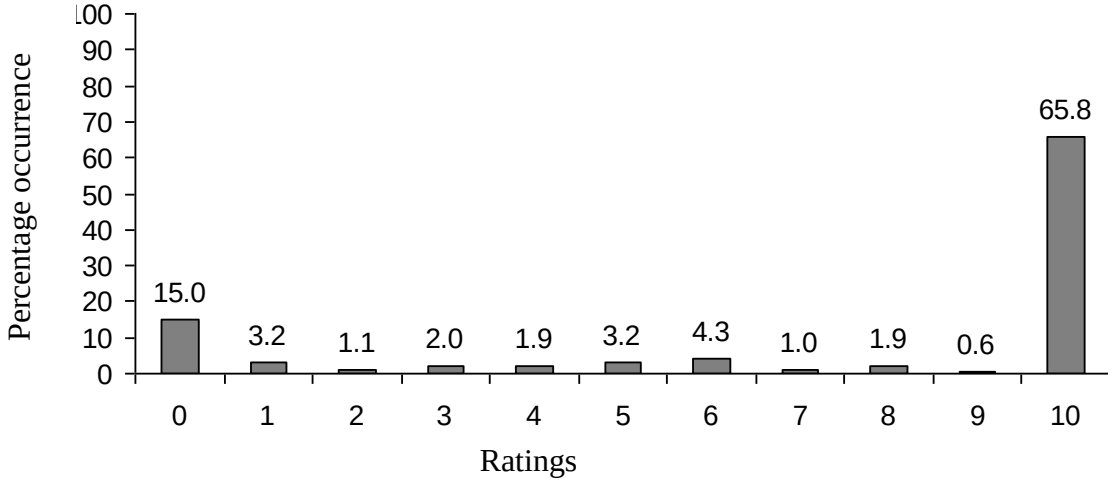


Figure 37: Percentage occurrence of individual values across all parameters observed for elephants in forest camps of Karnataka.

Discussion

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

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

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

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

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

Free-ranging status

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

Frequency of occurrence of disease/injury

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

Health status

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

Vaccination schedule

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

Some parameters that were given a rating between 5 and 7.5 were:

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

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

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

Mean rating below 3 for mahout/cawadi were:

1. Education level
2. Cawadi's experience with his elephant
3. Insurance cover for cawadi
4. Alcohol consumption by cawadi

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

Mean rating between 3 and 5 were:

1. Cawadi's wages
2. Rate of alcohol consumption by Mahout/cawadi

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

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

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

References:

1. Clubb, R. and Mason, G. (2002). A review of the welfare of zoo elephants in Europe: A report commissioned by the RSPCA. Oxford, U.K., University of Oxford, Animal Behaviour Research Group, Department of Zoology.
2. Gruber, T.M., Friend, T.H., Gardner, J.M., Packard, J.M., Beaver, B. and Bushong, D. 2000. Variation in stereotypic behaviour related to restraint in circus elephants. Zoo Biology **19**: 209-221
3. Kurt, F. and Garai, M. (2007). The Asian elephant in captivity—A field study. Cambridge University press, New Delhi.
4. Lair, R.C. (1997). Gone Astray - The Care and Management of the Asian Elephant in Domesticity. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand.
5. Poole, J. and Granli, P. (in press). Mind and Movement: Meeting the Interests of Elephants. Chapter 1. An Elephant in the Room: the Science and Well Being of Elephants in Captivity. pp:2-20. (Referred online http://www.loudmonks.com/)
6. Poole, J. H. (1987). Rutting behaviour in African elephants: the phenomenon of musth. Behaviour **102** (3/4): 283–316.
7. Sukumar, R. (1991). Ecology. In: Eltringham, S.K. (ed.), The Illustrated encyclopedia of elephants, Salamander Books, U.K. pp.78–101.

Section 3
Captive elephants in zoos

Section 3a
Captive elephants at Bannerghatta Biological Park (BBP)

1.

Executive Summary

Bannerghatta Biological Park (BBP) has a unique status vis-à-vis the nature of expansive forests it controls. The park is recognized by the Zoo Authority of India, and is home to a number of confined animals, including Asian elephant. This investigation evaluates the welfare of both the elephants and mahouts/cawadis.

Data was collected through observation of elephants and interview of personnel/ management. Each of these features, referred to as parameter, has been rated on a 0 to 10 scale with 0 representing the worst possible situation and 10 implying a satisfactory state, closer to what an animal experiences in the wild.

The Zoo maintains seven elephants with mean age of 30.3 yrs and the lone male in the group is of 15 yrs of age. The Zoo has a group of three elephants consisting of two generations of mother daughter pairs, along with unrelated elephants which were rescued from different institutions or captured from the wild. The mean rating for this parameter was 5 implying moderate conditions.

All the observed elephants are left free to range in the adjacent forest and kept in enclosures during the day for display to the public. Overall mean rating was 8 showing occurrence of satisfactory conditions.

The elephant enclosures have facility for drinking water, and are also left in the adjacent forest to range free. Overall rating was 5.5 with 36% of all values getting a rating less than 5.

All the elephants are allowed to walk. Hence, the rating assigned was 10; the observed females are given an opportunity to interact, except for the single male, for a mean duration of 13 hours. Group size included six elephants of varying ages, all females. Overall mean rating for this parameter was 8 indicating the existence of satisfactory conditions.

All the elephants are described as calm, except for the rescued male which is rough at times. One adult female has injured people. None has shown signs of stereotypy, except for the male which exhibits high intensity of nodding head/folding trunk. Overall mean rating was 9 indicating satisfactory conditions.

Only two elephants are made to work, carrying tourists for safari rides. Shade and water are available, with opportunity for rest (0.5–1 hour); overall mean rating was 5.

The Zoo elephants are allowed to graze/browse, at night, in the nearby forest. Along with this, supplements are provided through stall-feed, such as rice, jaggery, coconut, green grass, hay. Overall mean rating was 7 implying satisfactory conditions.

Four adult females exhibit oestrus cycles and having mated successfully, with two having mated with wild elephants. All the four elephants have given birth to calves, total number of calves born ranging from 2 to 8 since their first pregnancy; overall mean rating was 9.

One female adult elephant rescued from another institution has damaged footpads and dry skin. Three elephants have warty growths; overall mean rating was 8.

The Zoo has seven mahouts, with a mean age of 30.9 years; each mahout is assigned to one elephant. All the handlers belonged to Jenu Kuruba/Muslim community. Two handlers listed agriculture as a family occupation and the rest as mahouts. None, except one of the handlers had undergone health check-ups.

Overall mean rating of 7 for the elephants implies moderate conditions. Optimal conditions in captivity depend on considering the species' natural history and providing, wherever possible, for the needs of captive animals. Free-ranging opportunity in adjacent forest for the Bannerghatta Biological Park elephants is indeed a step in the right direction and will enhance the welfare of the animals.

Introduction

Bannerghatta Biological Park (BBP) has a unique status vis-à-vis the nature of expansive forests it controls. On the one hand, the Park, recognized by the Zoo Authority of India, is home to a number of confined animals which are displayed in various enclosures for the public, and on the other, it is contiguous with a 104 sq km protected piece of forest, declared a national park in 1974, within which diverse wildlife exists. The Zoo maintains several animals in captivity, while wild elephants use the adjacent forests as a corridor in their seasonal movement. This stretch of protected area connects to forest patches in the neighbouring state of Tamil Nadu (Varma *et al.*, 2005).

Objective

Captive situations impose a number of features which may be detrimental to the well-being of the animal. This report aims to evaluate the welfare status of the elephants as also of mahouts/cawadis.

Method

Stroud (in press) states the need to consider the elephant's biology, the complex set of variables which shape its behaviour and biology, as a reference to a captive's welfare. This report assesses the welfare of elephants in captivity by looking at the deviations experienced by the animals in their physical, social and behavioural features in comparison with those observed in the wild. Data was collected through observation and interview of personnel/management. Each of these features or sub-parameters has been rated on a 0 to 10 scale with 0 representing the worst possible situation and 10 implying a satisfactory state, closer to what an animal experiences in the wild.

Ratings are graded in the following manner:

- 0 to 2.4: Bad conditions
- 2.5 to 4.9: Poor
- 5.0 to 7.4: Moderate
- 7.5 to 10.0: Satisfactory

For sub-parameters relating to veterinary care such as availability of veterinary doctors, frequency of visits by the doctor, veterinary routine practiced, etc., satisfactory conditions represent ease of access and prevalence of features conducive to maintaining elephant health. Results depicting rating and percentage occurrence of different values for sub-parameters have been given. Sub-parameters representing a common feature such as shelter or water have been grouped together to form a parameter. Rating for a parameter is the mean across the sub-parameters.

Percentage occurrence of rating from 0 to 10, of each individual rating considering all the observed elephants across all sub-parameters, has been depicted in a graph to show the distribution of overall values from bad to satisfactory conditions.

The welfare of mahouts/handlers has been assessed by examining the socio-economic parameters and the handler's relationship with his animal in terms of experience, knowledge of commands, etc. Bad or poor handler welfare may be associated with poor handling of his animal. *N* refers to number of individuals (elephants or handlers) and N* to number of sub-parameters.

Results

Population status

The Zoo maintained seven elephants with a mean age of 30.3 yrs (range 7 to 45 years). Mean female age was 34.2 yrs (ranging from 7 to 45yrs). The lone male in the group was 15 years old.

Source of elephants

Moving animals from one location to another could entail different living conditions. This may be a source of stress for the elephants (Clubb and Mason, 2002). The Zoo maintained a group of three elephants consisting of two generations of mother–daughter pairs, along with unrelated elephants which were rescued from different institutions or captured from the wild. Mean rating for this parameter was 5.3 (SE = 1.8, N = 7) implying moderate conditions.

Number of mahouts changed

Frequent changes of mahout may be stressful for both the elephant and the handler as it involves a period of adjustment (Namboothiripad, 1998). Mean rating was 4.2 (SE = 1.7, N = 6) as the number of mahouts changed varied from zero to ten.

Shelter

This parameter represents physical features provided in captivity. All the observed elephants were left free to range in the adjacent forest and kept in enclosures during the day for display to the public. While providing rides for people, two adult female elephants were not in the enclosure. Flooring varied from stone/concrete in the morning to earthen/natural at night or all earthen. Man-made structural (sheet) shade was available for only one elephant while the others had access to shade from trees. Overall mean rating was 7.7 (SE = 1.3, N = 4) implying satisfactory conditions (Figures 1 and 2).

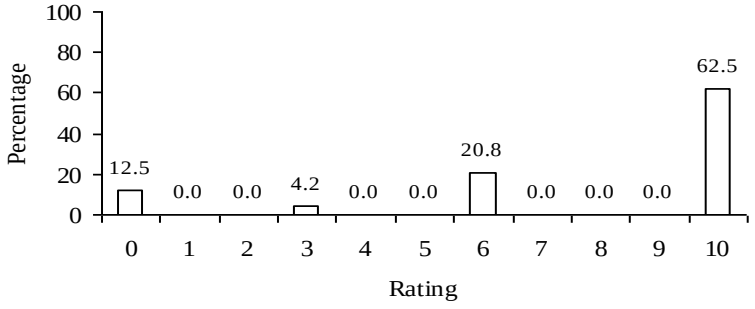
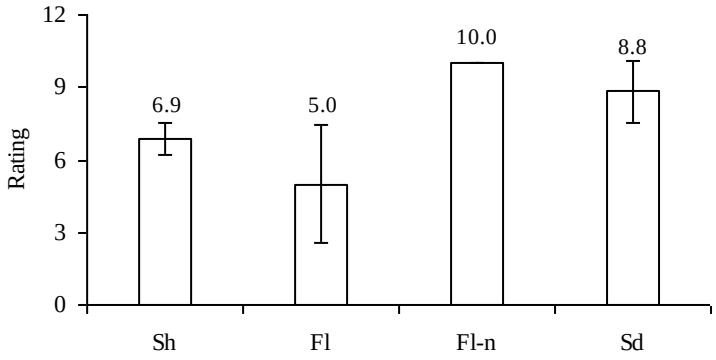


Figure 1: Percentage occurrence of rating for shelter.

Elephants given an opportunity to range free in natural forest conditions are given high rating. Mean rating was 6.9 (SE = 0.7, N = 6) as the elephants were allowed to range free in the nearby forests only at night. Unsuitable substrates can result in foot-related problems (Benz, 2005). Mean rating was 5.0 (SE = 2.5, N = 6) as three of the six observed elephants had stone/concrete floor.



Sh: Shelter type Fl: Flooring Fl-n: Flooring (night)
Sd: Shade availability

Figure 2: Rating for shelter sub-parameters

Water

Shoshani and Eisenberg (1982) state that wild elephants drink/bathe at least once a day and do not move far from a source of water. The elephant enclosures had facility for drinking water. The animals seemed to drink 34 times and were also left in the adjacent forest to range free. Bathing place was lake/pond and all the animals were bathed daily for a duration ranging from 1 to 2.5 hours using brush/stone/Screw Pine (*Pandanus* spp.) fruit. Distance to water source ranged from 6 ft to 5 km.

Overall rating was 5.5 (SE = 1.2, N = 7) with 36% of all values getting a rating less than 5.

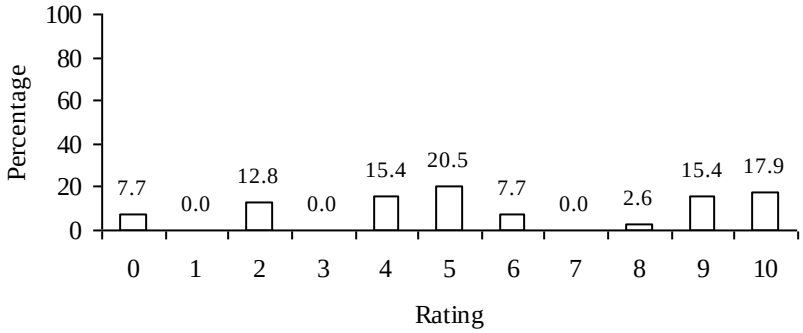
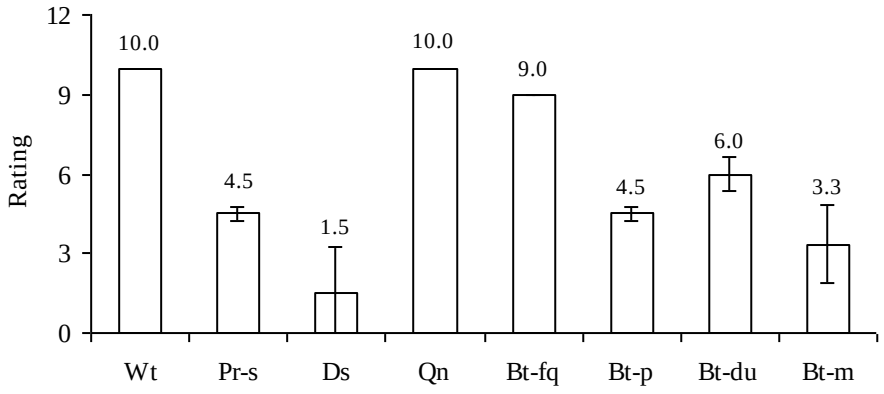


Figure 3: Percentage occurrence of rating for water.

Availability of running water sources such as rivers has been given high rating. All the observed elephants had access to lakes/ponds; mean rating for water-related parameter (Figure 4) was 4.5 (SE = 0.3, N = 6) implying poor conditions for this sub-parameter. Adult elephants are reported to drink around 200 l of water per day (Sukumar, 1991). Elephants allowed to range free in forest conditions with access to water have been given high rating. All the observed elephants were allowed into the adjacent forest at night, hence the rating of 10.0 (SE =0.0, N = 6).

This sub-parameter considers duration of bathing following free-ranging activity by the elephants. The duration ranged from 1 to 2.5 h, hence, mean rating was 6.0 (SE = 0.6, N = 5).



Wt: Availability of water in enclosure
Pr-s: Perennial water source
Ds: Distance to water source
Qn: Quantity of water consumed
Bt-fq: Bathing frequency
Bt-p: Bathing place
Bt-du: Bathing duration
Bt-m: Bathing materials

Figure 4: Rating for water-related parameters for captive elephants in BBP.

High rating has been given for provision of suitable sleeping place. The observed elephants were allowed to sleep in the forest with only one adult female elephant sleeping within a shelter. Mean rating was 10.0 (SE =0.0, N = 3) implying satisfactory conditions.

Elephants have been observed to sleep for 34 hours at night (Kurt and Garai, 2007). Deviations from this duration have been given low rating. Mean duration of sleep was 3.6 h (ranging from 16 h). Rating of 5.6 (SE = 2.9, N = 4) suggests moderate conditions.

Walk

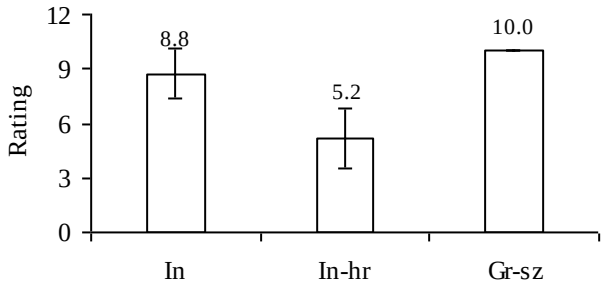
All the elephants were given opportunity to walk. Hence, the rating of 10.0 (SE = 0.0, N = 7).

Social Interaction

Elephants are highly social animals with females spending their lives in the company of related individuals (Sukumar, 2003). Males disperse gradually from their natal herd as they attain sexual maturity (Poole and Moss, 2008). The observed female elephants were all given an opportunity to interact, except for the single male. The animals were allowed

to interact for a mean duration of 13 hours (range 5–24 h). Group size included six elephants of varying ages, all females.

Overall mean rating for this parameter (Figure 5) was 7.9 (SE = 1.7, N = 3) indicating existence of satisfactory conditions. All animals, except for the single male elephant, were allowed to interact with con-specifics. Mean rating was 8.6 (SE = 1.5, N = 7). High rating was given for elephants with unrestricted access to social interaction. Mean rating for interaction hours was 5.2 (SE = 1.6, N = 5).



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

Figure 5: Rating for social interaction related parameters for captive elephants in BBP

Chaining

The practice of mounting chains on elephants is not only to manage the animal, but also to keep track of it while ranging free. Chains were tied to the legs of all the observed elephants with a mean length of 47.8 cm (range 25 to 70 cm). Chain size ranged from 2.5 to 5.5 cm, with a length of 360 to 1200 cm. All the observed elephants were allowed to range free at night in the nearby forest. Use of chains is given low rating. Mean rating was 1.0 (SE = 0.0, N = 7).

Free ranging at night is rated considering the use of drag chains/hobbles while ranging free. Low rating is given for such use. Mean rating was 2.0 (SE= 0.0, N = 5).

Behaviour

Ease of handling of the elephant along with occurrence of abnormal behaviour is rated. All the elephants were described as calm, except for the rescued male which was rough at times. One adult female seems to have injured people. None of the elephants was showing signs of stereotypy, except for the male which was said to exhibit high intensity of nodding head/folding trunk. Overall mean rating was 8.7 (SE = 0.5, N = 3) indicating satisfactory conditions (Figure 6).

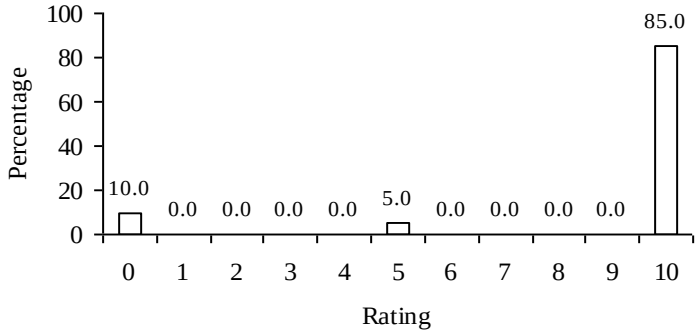
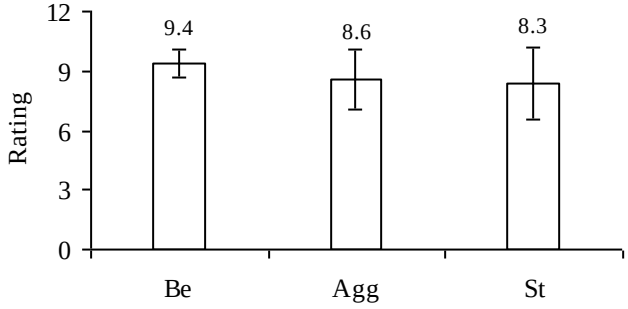


Figure 6: Percentage occurrence of rating for behaviour for captive elephants in BBP

Mean rating for behaviour-related parameter (Figure 7) was 9.3 (SE = 0.8, N = 7) showing ease of handling and quiet temperament of the elephants. Only one elephant, an adult female, seems to have injured two persons. Mean rating was 8.6 (SE = 1.5, N = 7).



Be: Observed behaviour Agg: Incidents of aggression
St: Occurrence of stereotypy

Figure 7: Rating for behaviour-related parameters for captive elephants in BBP.

Work

This parameter has been designed to rate work conditions for the elephant. Work that replicated to the extent possible, the animal's life in the forest, was given high rating. Only two elephants were made to work, carrying tourists for safari rides. Timings varied from 11 a.m. to 5 p.m./12 noon to 5 p.m. Maximum weight carried varied from 300 to 700 kg over a distance of 300–500 m. The number of people carried was 4-6 with provision of an iron/wooden howdah weighing 50 to 110 kg. Shade and water were available, with opportunity for rest (0.5 to 1 h). No food was given during work. Overall mean rating was 5.4 (SE= 1.3, N** = 14). N** refers to number of individual ratings considered across all sub-parameters for all elephants observed and 43% of ratings fall in 10 (Figure 8) and 36% under 0 values.

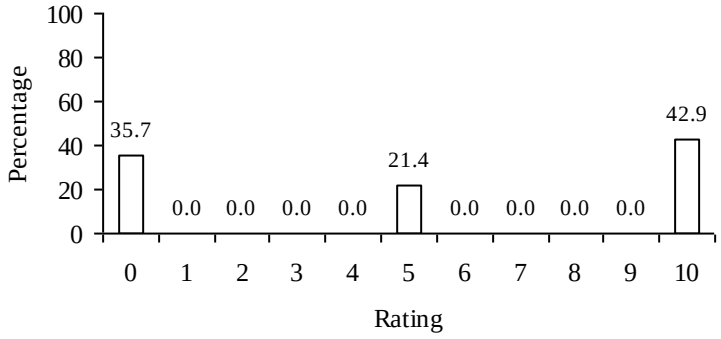
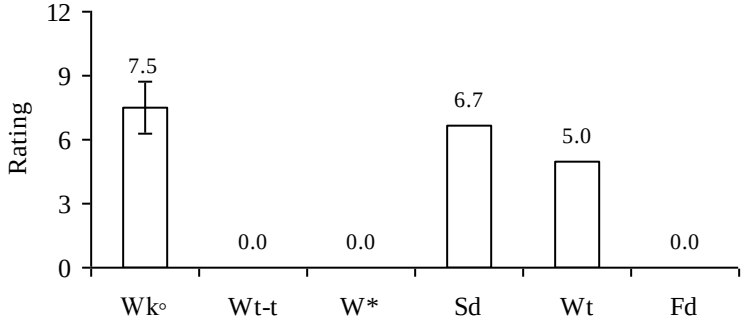


Figure 8: Percentage occurrence of rating for work for captive elephants from BBP

Nature of work was rated. Only two elephants were used for safari rides. Hence, mean rating for work-related parameter (Figure 9) was 8.0 (SE = 1.4, N = 5). Availability and access to water, when needed by the elephant, was rated. Both working elephants were provided with water, with one elephant said to be provided with insufficient quantity. Mean rating was 7.5 (ranging from 5 to 10). Elephants have been observed to rest during the hottest parts of a day (Kurt and Garai, 2007). Both elephants at the Zoo were worked through the day. Mean rating was 0.0.



Wk: Work type Wt-t: Work timing W: Water availability
Sd: Shade availability Wt: Weight carried Fd: Food availability

◦: Number of elephants observed = 5
*: Number of elephants observed = 1
Remaining sub-parameters, number of elephants observed = 2

Figure 9: Rating for work-related parameters for captive elephants in BBP

Food provisioning

Wild elephants have been observed to feed on a number of plants (McKAy, 1973). The Zoo elephants were all allowed to graze/browse, at night, in the nearby forest. Along with this, supplements were provided through stall-feed, such as rice (*Oryza sativa*), jaggery (sweet derived from sugarcane *Sacharrum* sp.), coconut (*Cocos nucifera*), green grass,

and hay. Overall mean rating was 7.0 (SE = 1.2, N = 4) implying occurrence of satisfactory conditions as 50% ratings fall in 10 (Figure 10).

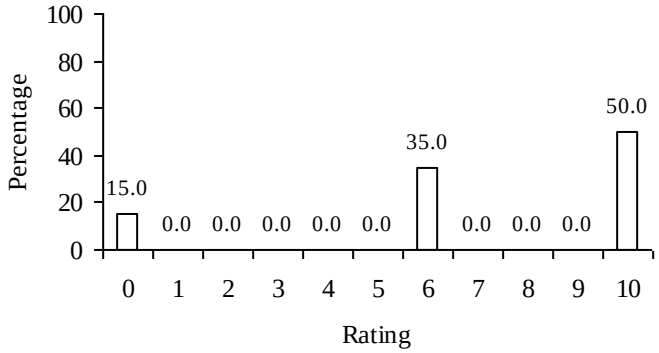
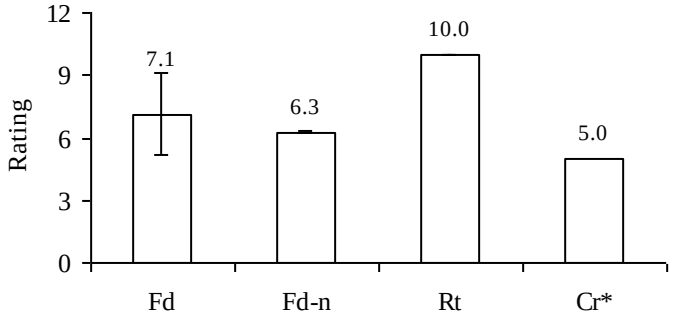


Figure 10: Percentage occurrence of rating for food for captive elephants in BBP.

Opportunity to range free to browse/graze in forest conditions was given high rating as elephants are known to feed on a wide variety of plants (Shoshani and Eisenberg, 1982). Mean rating for food-related parameter (Figure 11) is 6.7 (SE =2.3, N = 6) with two elephants provided only stall feed. Of the two observed elephants, one adult female seems to have raided crops in the nearby fields.



Fd: Food provisioning type Fd-n: No. of food items
Rt: Usage of ration chart Cr: Crop raiding incidents

*: refers to observation of two elephants only

Figure 11: Rating for food-related parameters for elephants in BBP.

Reproductive status

Rating has been designed to assess the status of reproductive functioning with occurrence of social and physiological aspects representative of those observed in the wild. Four adult females seem to exhibit oestrus cycles and had also mated successfully, with two females having mated with wild elephants. All the four elephants had given birth to calves, total number of calves born ranging from 2 to 8 since their first pregnancy. Mean

calving interval was 5 years (recorded for two elephants). Calf of one elephant had died prematurely. The lone male had not exhibited signs of musth. Overall mean rating was 9.0 (SE = 0.7, N** = 21). N** refers to number of individual ratings across all the sub-parameters for all the elephants observed. Percentage occurrence of rating values for reproductive status suggests that 81% of values fall in 10 (Figure 12).

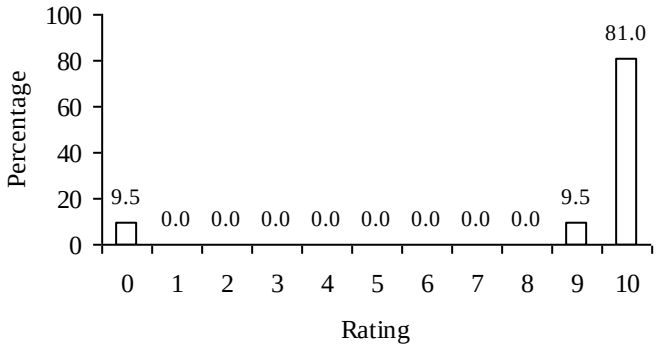
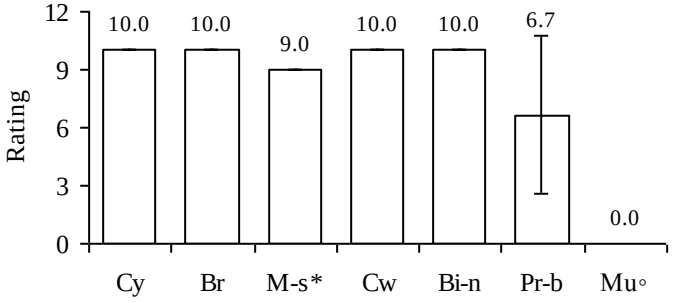


Figure 12: Percentage occurrence of rating for reproductive status for captive elephants in BBP.

Four females seem to exhibit oestrus cycles while the 15-yr-old male had not been in musth. Mean rating for being reproductive active/ not (Figure 13) was 10.0 (SE = 0.0, N =4) for the females and 0.0 for the male. Based on the age of the mother, number of births was rated. High rating is given for numbers which corresponded with age. Mean rating was 10.0 (SE = 0.0, N =4).



Cy: Cycling status Br: Opportunity for breeding
M-s: Male source Cw: Presence of cows during birth
Bi-n: Number of births Pr-b: Premature births
Mu: Occurrence of musth
*: Number of elephants = 2
◦: Number of elephants = 1

Figure 13: Rating for reproductive status of captive elephants in BBP

Health status and veterinary routine

Physical conditions and the elephant's way of life in captivity may predispose the animals to certain disease/injuries such as foot problems (Mikota et al., 1994) and excess

food (obesity) or malnourishment. One female adult elephant, which was rescued from another institution, seems to have damaged footpads and dry skin. Three elephants seem to have warty growths. The observed elephants were de-wormed and vaccinated with one elephant not being immunized. Oiling was done daily for all the elephants on the head and leg using castor oil. Overall mean rating was 7.7 (SE = 0.9, N** = 18). N** refers to the number of individual ratings across all observed sub-parameters for all the elephants. Percentage occurrence of ratings for health and veterinary status suggest that about 72% values fall in10 (Figure 14).

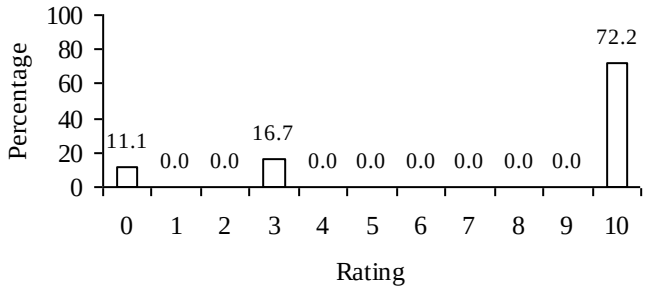
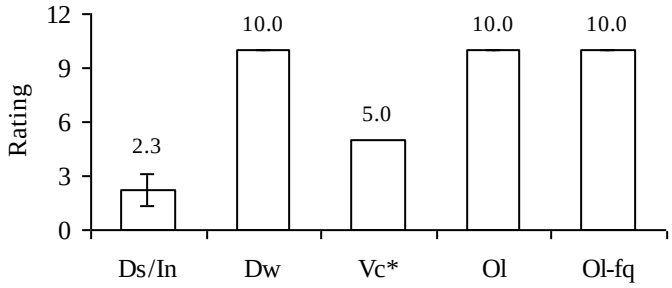


Figure 14: Percentage occurrence of rating for health and veterinary routine for elephants in BBP.

Rating was designed to reflect the nature of disease/injury, its effect on causing further health problems and curability. Mean rating for health and veterinary care-related parameter (Figure 15) was 2.3 (SE = 0.9, N = 4). Rating for de-worming status was 10.0 (SE= 0.0, N= 4) showing that the practice was followed for the observed elephants.

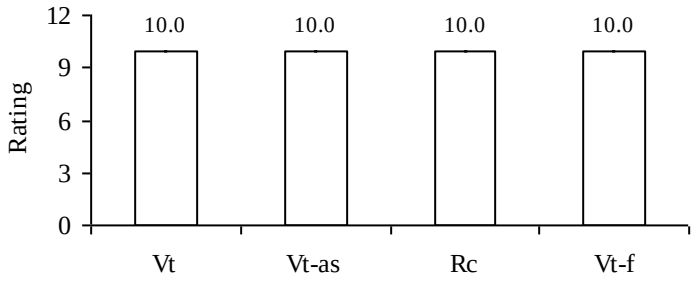


D/In: Disease/Injury occurrence Dw: De-worming status
Vc: Vaccination status Ol: Oiling status Ol-fq: Frequency of oiling
*: Number of elephants = 2

Figure 15: Rating for health and veterinary care-related parameters for elephants in BBP.

Veterinary personnel and infrastructure availability

All the elephants had access to a veterinary doctor and two assistants attached to the Zoo. Treatment register seemed to be maintained. The Zoo also had hospital and laboratory facilities. Overall mean rating for this parameters (Figure 16) was 10.0 (SE = 0.0, N = 4).



Vt: Veterinary doctor availability Vt-a: Veterinary assistant availability
Rc: Record maintenance Vt-f: Veterinary facility availability

Figure 16: Rating for veterinary personnel and infrastructure for captive elephants in BBP

Welfare status of mahout

The welfare of mahout/cawadi was assessed by examining their socio-economic profile. Their experience with elephants was rated considering parameters related to professional experience. The Zoo had seven mahouts, with a mean age of 30.9 yrs (SE = 2.7, N = 7). Each mahout appeared to be assigned to one elephant. The percentage occurrence of overall rating suggests that (Figure 17) about 42% values come under 10.

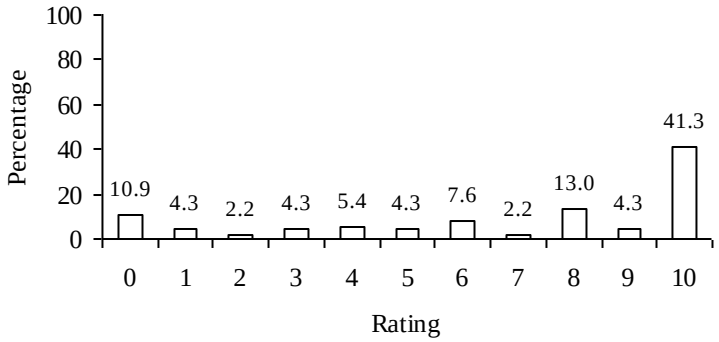


Figure 17: Percentage occurrence of overall rating for mahout welfare parameters.

- All the handlers belonged to Jenu Kuruba/Muslim community.
- Only two handlers listed agriculture as family occupation, the rest mentioned being a mahout as family occupation.
- Education level of the handlers varied from $4^{th}$to 8^{th} grade.
- Mean salary was Rs. 33485.71, ranging from Rs 27,000 to 50,000/- annually.
- All, except one, was married with number of children ranging from 1 to 4.
- None, except one, of the handlers had undergone health check-ups.

- Except one, all the handlers had been insured with their own salary being used for paying the premium amount. Only one handler's premium was paid by the Forest Department.
- Amount for which the handlers were insured varied from Rs.25,000/- to Rs.1,00,000/-
- None of the handlers seems to consume alcohol.

Overall mean rating for this parameter was 6.9 (SE = 0.4, N = 67) implying occurrence of moderate conditions. N refers to number of individual ratings considered across all the sub-parameters for socio-economic status.

Mean rating was 6.2 (SE = 0.7, N = 6) showing existence of moderate conditions. Rating of 10 has been designed to represent a salary capable of supporting a family of four in an urban environment. Mean rating was 6.0 (SE= 0.5, N = 7) with only one mahout getting a satisfactory rating of 8.

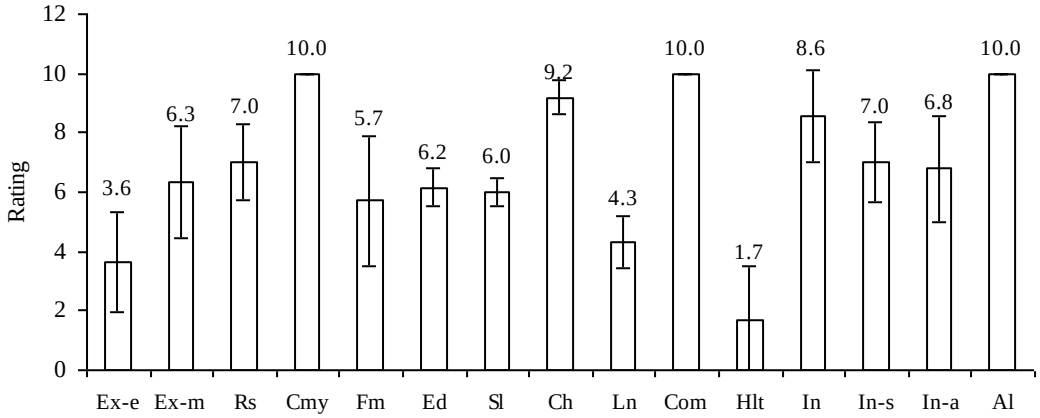
High rating represents the absence of alcohol consumption (Figure 18). Mean rating was 10.0 (SE = 0.0, N = 5) implying none of the handlers consumed alcohol. Mahout's professional ability was rated based on his experience with specific elephant in this profession, use of commands and reason for taking up this profession.

- Mean experience (Figure 18) in this profession was 10.9 yrs (ranging from 0.5 to 22 yrs).
- Mean experience with specific elephant was 4.9 yrs (ranging from 0.5 to 15 yrs).
- Only one handler had joined the profession out of interest, while five stated it was a traditional occupation. One mahout had chosen this job as a means of employment.
- All the mahouts seemed to have good knowledge of commands.

Overall mean rating was 6.6 (SE = 0.8, N = 25) showing the existence of moderate conditions for this parameter. N refers to the number of individual ratings across all the sub-parameters observed.

When experience in this profession is calculated as percent of mahout's age, it ranged for 3 to 56%. Mean rating was 6.3 (SE = 1.9, N = 6). Experience calculated as per cent of specific elephant's age ranged from 1 to 90%. Mean rating was 3.9 (SE = 1.6, N = 7).

.



Ex-e: Experience (% of elephant age) Ex-a: Experience (% of mahout's age)
Rs: Reason for choosing this profession Cmy: Community of mahout
Fm: Family occupation Ed: Education status Sl: Salary Ch: Number of children
Ln: Number of languages known Com: Knowledge of commands Hlt: Health check-up status
In: Insurance cover availability In-s: Insurance source
In-a: Insurance amount Al: Alcohol consumption

Figure 18: Ratings for mahout welfare parameters

Overall mean rating for elephants was 7.3 (SE = 0.2, N** = 241) implying occurrence of moderate conditions. N** refers to number of individual ratings across all the sub-parameters (Figure 18) observed considering all the elephants.

Comparison of percentage occurrence of rating (all ratings and 10-0 values) suggests that values dominate all the ratings and also for the ratings from 0/10 type (Figure 19).

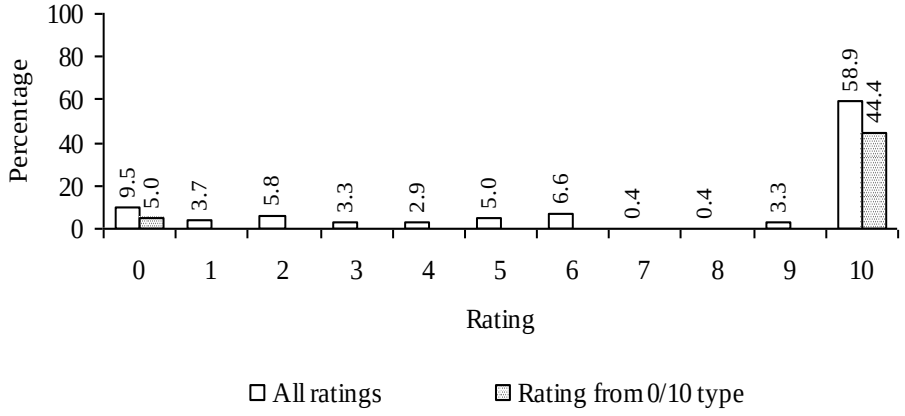


Figure 19: Comparison of percentage occurrence of rating

Discussion

Overall mean rating for elephants was 7.4; this could be a consequence of two factors:

1. True picture:
   This could represent the actual situation of the elephants in this Zoo.

2. Consequence of data type collected:
   The survey consisted of collection of detailed information regarding relevant aspects of the elephants. This included data which was of the "presence–absence" types which could be rated in one of two ratings only: 0 or 10. The present data contain 45.1% of such observations, of which ten scores contribute 39.5% to the overall rating. This indicates the presence of satisfactory features to the extent of 40%. However, with availability of detailed and relevant information for such data, a more representative situation can be observed. The rating could then be different from the one presented here.

Optimal conditions in captivity depend on considering the species' natural history and providing, wherever possible, for the needs of captive animals (Kane *et al.*, 2007).

- The free-ranging opportunity in adjacent forest for the elephants of Bannerghatta Zoo is indeed a step in the right direction, but this is offset by keeping some of the elephants on concrete/stone floor in the morning. Benz (2005) states that the sole of the elephant's foot has regions of lesser resistance—implying softer areas susceptible to unsuitable substrates. The author also cites several papers which link hard substrates and occurrence of foot problems.

- Use of elephants to provide rides: Two elephants are being used to provide safari rides. The rides ranged 4–5 hours during the day. This may not be conducive to the elephants when air temperatures are high and the elephants' backs are covered by an howdah. This practice may obstruct heat loss in the context of poor thermoregulation as a consequence of poor surface area to volume ratio (Weissenbock, 2006).

- The use of drag chains to ensure that the elephants do not wander too far: consistent use of chains on the same region can lead to wounds which are difficult to heal (Kurt and Garai, 2007). If alternate legs are chained or if other means are employed, it would be a better option.

- Two elephants, an adult male and a female, are both said to be rough at times. Management of these animals needs to be regulated under expert advice to reduce such behaviour.

- Provision of water during summer when the elephants range free: While data is deficient on this particular aspect, it is worthwhile to mention that water sources may be absent in the forest during summer.

- The Zoo did not have too many experienced handlers, and there was high mahout elephant turnover. Frequent change of mahouts may not be suitable for either mahout/elephant.

References:

1. Benz, A. (2005). The elephant's hoof: Macroscopic and microscopic morphology of defined locations under consideration of pathological changes. Dissertation, Druck: RoNexus Services AG, Basel
2. Clubb, R. and Mason, G. (2002). A review of the welfare of zoo elephants in Europe: A report commissioned by the RSPCA. Oxford, U.K., University of Oxford, Animal Behaviour Research Group, Department of Zoology.
3. Kane, J.D.L., Forthman, D., and Hancocks, D. (2007-updated). Appendix. Optimal Conditions for Captive Elephants: A Report by the Coalition for Captive Elephant Well-Being. In: An Elephant in the Room: the Science and Well Being of Elephants in Captivity. pp: 246–279. (Referred online http://www.loudmonks.com/)
4. Kurt, F. and Garai, M.E. (2007). The Asian elephant in captivity—a field study. Foundation books, Cambridge University press, New Delhi.
5. Mikota, S.K., Sargent, E.L., and Ranglack, G.S. (1994). Medical management of the elephant. Indira Publishing House, U.S.A.
6. NampoothiriPad, M. (1998). Practical pointers. In: Practical elephant management A handbook for mahouts. (Namboodiri, N. Ed.). Elephant Welfare Association.
7. Poole, J.H. and Moss, C.J. (2008). Elephant sociality and complexity The scientific evidence. In: Elephants and ethics toward a morality of coexistence (Eds: Wemmer, C and Christen, C. A) The John Hopkins University Press, Baltimore. (Accessed online: http://www.elephantvoices.org/index.php?topic=tools&topic2=tools/documents/2_Poole_Moss_Final_7_12_06.pdf).
8. Shoshani, J. and Eisenberg, J.F. (1982). *Elephas maximus*. Mammalian species.182: 1-8.
9. Stroud, P.C. (in press). Chapter 8. Tradition, Biology and Morality in Captive Elephant Management, In: An Elephant in the Room: the Science and Well Being of Elephants in Captivity. pp: 99-108. (Referred online http://www.loudmonks.com/)
10. Sukumar, R. (1991). Ecology. In: Eltringham, S.K. (ed.), The Illustrated encyclopedia of elephants, Salamander Books, U.K. pp.78–101.
11. Sukumar, R. (2003). *The living elephants*. New York: Oxford University Press.
12. Weissenbock, N. M. (2006). How do elephants deal with various climate conditions? Previous results, recent data and new hypotheses**.** Vienna Zoo Tiergarten Schönbrunn, Vienna, Austria, Europe

Section 3b
Captive elephants in the Chamarajendra Zoological Garden (Mysore Zoo)

Executive summary

The Chamarajendra Zoological Garden (Mysore Zoo) is home to a number of indigenous and exotic wildlife. The Zoo maintains 11 elephants; of these, three are of *Loxodonta* spp. (African elephants) and the rest belong to *Elephas maximus* (Asian elephants). Together, there are four males and seven females and their mean ages are 17 years (females) and 24 years (males).

Data on all these individuals was collected through observation and interview of personnel/management. Each of these features has been rated on a 0 to 10 scale with 0 representing the worst possible situation and 10 implying a satisfactory state, closer to what an animal experiences in the wild. The welfare status of mahouts/handlers has been assessed by examining the socio-economic parameters and the handler's relationship with his animal in terms of experience, knowledge of commands, etc.

High rating is given to elephants born in captivity, as this implies less drastic change in living conditions. The mean rating for the source of Zoo elephants was 6.5 with three elephants being born in captivity. The elephants are provided with two types of shelter: a day enclosure, 4 acres in size, with natural vegetation, and a night enclosure where the elephants are chained.

All the elephants have access to drinking/bathing water, however, water sources are tanks and taps. The mean rating of 3.9 shows the occurrence of poor conditions. All the animals are walked within the enclosure; two are taken for walk during the day as part of providing rides; all the elephants have opportunity for interaction. Interaction of elephants was within species with the African species reported to interact among themselves. Opportunity for physical exercise and social interaction is rated and the mean rating was 6.7.

Captive elephants are subjected to chaining for different reasons. This parameter is rated with features of opportunity to range free; the duration, the region of chaining and the mean rating for this parameter is 2 suggesting the prevalence of bad conditions.

Except as display animals at the zoo, the elephants have no specific work; however, two adult elephants are used for tourist rides. All the elephants are given only stall- feed in the enclosure that include dry and fresh grass, rice, coconut, jaggery, ragi balls, sugarcane, greens, reed grass, paddy, nelulu, carrot, banyan leaves, straw, 'eayhulu', fig greens, halina soppu ;the mean rating for food provisioning was 6.2.

Three female elephants were cycling, were exposed to males and the mean rating for female reproductive status was 9.2. Captive conditions may lead to incidence of specific health issues; however, the mean rating for health status for the elephants kept in zoo was 9 suggesting satisfactory conditions.

The elephants are treated by a veterinary doctor and two assistants; the zoo associated veternarian's experience with elephants was 15 years with daily visits to check on the animals. The mean rating was 9 indicating satisfactory conditions.

Welfare of handlers has been assessed in terms of their socio-economic profile and their experience in the profession. Percentage occurrence of overall rating showed 25% incidence of values less than 5.

The overall mean rating for elephants was 6.9; it indicates the occurrence of moderate conditions. Excluding veterinary parameters (as they refer to availability of personnel and schedule of appropriate practices in maintaining animal health and do not involve elephants directly), the overall mean rating was 5.7. The occurrence of scores of 10 to the extent of 42% in the overall rating indicates the prevalence of satisfactory conditions to this extent.

Introduction

The Chamarajendra Zoological Garden (Mysore Zoo) is spread over 250 acres, and is home to a number of indigenous and exotic wildlife. The then ruler of Mysore, Maharaja Chamaraja Wodeyar, had established the zoo in 1892. It is now managed by the Karnataka Forest Department, under the aegis of the Central Zoo Authority. Its stated objective is to educate public about wildlife and conservation of species through *ex-situ* and captive breeding methods (official website: http://www.mysorezoo.in/).

Objective

Captive situations introduce a number of factors into an elephant's life through imposition of living conditions (physical and biological) which may affect its welfare. Also, handlers are integral to elephant management in captivity.

Hence, the conditions existing in the zoo were assessed to:

- Evaluate the welfare status of the elephants
- Evaluate the welfare status of mahouts/cawadis

Method

The behavioural, social and psychological needs of elephants have been shaped by a complex interaction of environmental/social/hereditary factors in the wild. In captive situations, the elephant experiences deviations in its living environment, and as a consequence, there is deficiency in attainment of these needs. The deviations can be used to measure the status of its welfare. Veasey (2006) states captivity should provide features which are based on the knowledge of the animal's biology and behavioural ecology. Captive conditions of elephants have been assessed considering their physical, social, behavioural and physiological features. Data was collected through observation and interview of personnel/management. Each of these features or sub-parameters has been rated on a 0 to 10 scale with 0 representing the worst possible situation and 0 implies a satisfactory state, closer to what an animal experiences in the wild.

Rating values were graded in the following manner:

- 0 to 2.4: bad conditions
- 2.5 to 4.9: poor
- 5.0 to 7.4: moderate
- 7.5 to 10.0: satisfactory

For some sub-parameters such as availability of veterinary doctors, frequency of visits by the doctor, etc., the ideal condition represents the ease of access and prevalence of features conducive to maintaining elephant health. Results depicting rating and percentage occurrence of different values for sub-parameters have been given. Sub-parameters representing a common feature such as shelter or water have been grouped together to form a parameter. Rating for a parameter is the mean across the sub-parameters. Percentage occurrence of rating from 0 to 10, across each individual rating considering all the observed elephants, has been depicted in a graph to show the distribution of overall values from bad to satisfactory conditions.

The welfare status of mahouts/handlers has been assessed by examining the socio-economic parameters and the handler's relationship with his animal in terms of experience, knowledge of commands, etc. Bad or poor handler welfare maybe associated with poor handling of his animal. N refers to number of individuals (elephants or handlers) and N* to sub-parameters.

Results

Population status of elephants

Mysore Zoo maintains 11 elephants (four male and seven female) with the mean age of (Figure 1) 19.3 yrs (SE = 7.4, *N* = 11). Of these, three are *Loxodonta* sp. (African elephants) and the rest *Elephas maximus* (Asian elephants). The mean age of females (considering both species together) is 16.9 yrs (SE = 8.1, N =7) and of males it is 23.5 yrs (SE = 18.1, *N* = 4).

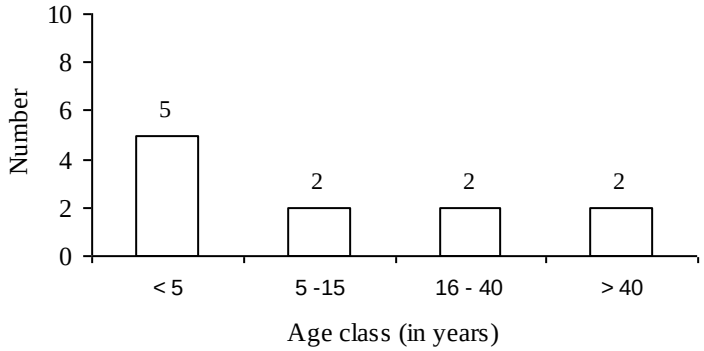


Figure 1: Age distribution of elephants in Mysore Zoo

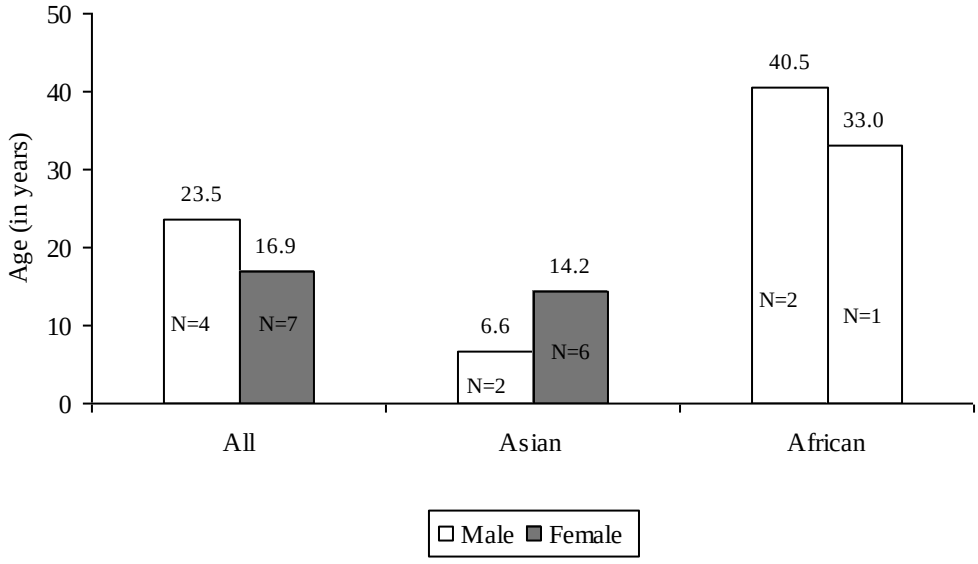
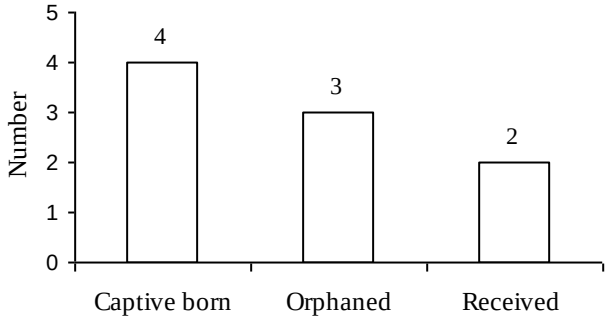


Figure 2: Age distribution of elephants, species and sex wise, in Mysore Zoo

Source of elephants

- Elephants less than five years, captive born (Figure 3) in the zoo: two in number
- Elephants > 5 and < 15 years, captive born in the zoo: one
- Elephants > 15 years, captive born in the zoo: one



* Received: refers to elephants received in exchange program form other zoos

Figure 3: Source (origin) of elephants

Change in ownership of elephants with consequent shifting of location has potential welfare implications (Clubb and Mason, 2002). High rating is given to elephants born in captivity, as this implies less drastic change in living conditions. The mean rating for birth was 6.5 (SE = 1.1, , N = 10) with only three elephants being born in captivity.

Shelter

- The elephants have two types of shelter: one, a day enclosure, 4 acres in size, with natural vegetation and the second, a night enclosure where the elephants are chained
- Flooring during day is natural, except for two young animals which have concrete floor
- Night flooring is of concrete for all elephants except three adult animals
- Shelter type is open with access to shade (from trees) or from man-made structures such as sheets

The physical conditions provided for captive elephants forms an important factor in influencing its welfare. Shelter conditions which approximate wild living conditions have been given high rating. The mean rating was 6.1 (SE= 1.5, N = 6) indicating occurrence of moderate conditions. Distribution of ratings for shelter-related parameters suggests (Figure 4) that 10 values dominate.

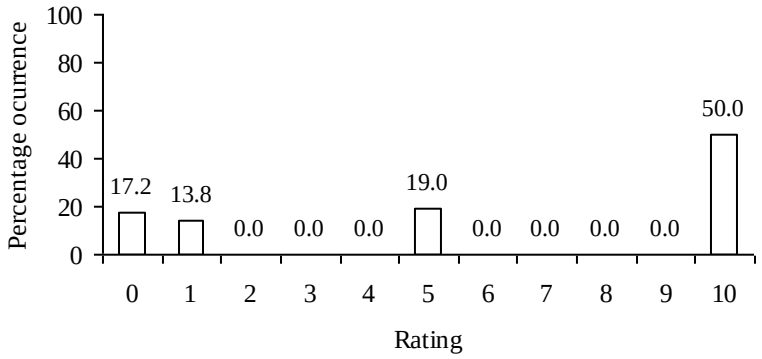


Figure 4: Percentage occurrence of rating for shelter

Elephants allowed to range free in natural, forest conditions are given high rating. The mean rating for Mysore Zoo for this parameter) was 1.9 (SE = 1.1, N = 10) implying bad conditions. Rating for space available to the elephant is assigned based on the actual size of the shelter and the size used by the elephants in the context of being restrained by chaining.

The space available to the elephants is 4 acres when the elephants are on "exhibit" and are chained when the zoo is closed to the visitors. The mean rating for shelter related parameter (Figure 5) was 4.5 (SE =0.5, N = 10) and highlights poor conditions. The mean rating is 8.0 (SE = 1.4, N = 10) with only two elephants getting a rating of 0 due to unsuitable substrates.

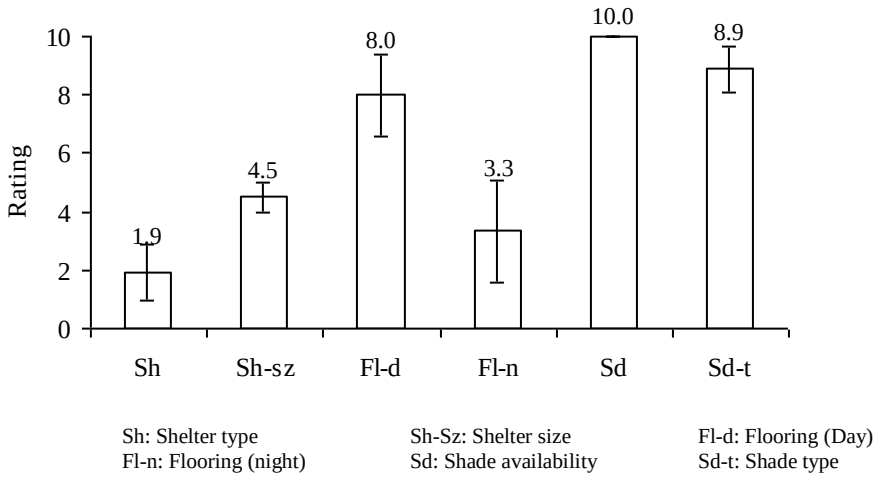


Figure 5: Rating for shelter sub-parameters

Water

- All the elephants had access to drinking/bathing water
- Water source was through tanks/taps
- Distance to water source varied from 10 to 60 ft

- Mean number of times the elephants drink water is 5.2 (N = 10), consuming a mean of 131.1 l /day (N = 7)
- Bathing frequency varied from twice to thrice a week within the enclosure for a mean of 1.5 h (N = 9) using brush/stone

The quantity and quality of water provided along with landscape features for engaging in activities typical to the species while drinking/bathing are given high rating. The mean rating was 3.9 (SE = 1.2, N = 5) showing prevalence of poor conditions. Distribution of ratings (Figure 6) shows that values 5 dominate, only 2% values fall under 10.

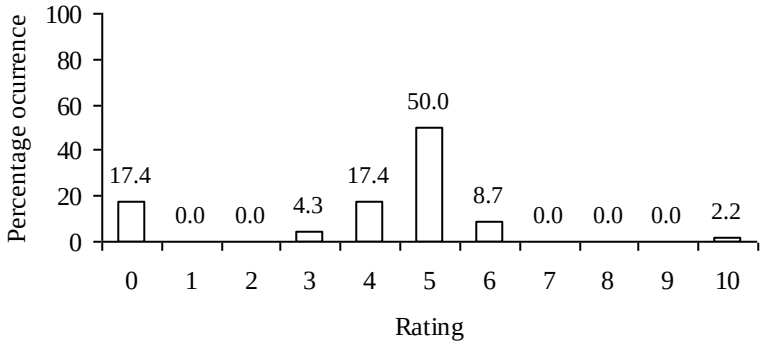
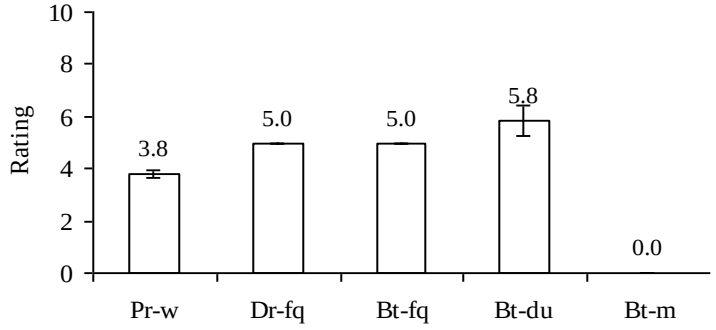


Figure 6: Percentage occurrence of rating for water

Figure 7 depicts rating for water related parameters. Running water sources harbour relatively less contamination than stagnant water. The mean rating for this parameter was 3.8 (S.E. = 0.1, N = 10) as all the elephants have access to water tanks/tap water. The quantity of water consumed is rated in terms of number of times the elephant drank water. The mean rating for this sub-parameter was 5.0 (S.E. = 0.0, N = 10) as all elephants lived in semi-natural conditions where water was made available through containers. The Zoo uses hard materials as a scrub while bathing and hence was given low rating for this sub-parameter as it could prove injurious to the skin. The mean rating was 0.0 (SE. = 0.0, N = 7).



Pr-w: Perennial water source Dr-fq: Drinking frequency
Bt-fq: Bathing frequency Bt-du: Bathing duration
Bt-m: Bathing materials

Figure 7: Rating for water-related parameters of elephants from Mysore Zoo

Sleep and related features

- All elephants are rested within the enclosure
- Mean sleeping area is 347.6 sq. ft (N = 5) within enclosure/shelter
- Mean sleep duration is 6.7 h (N = 9)

The mean rating for provision of suitable place and normal duration of sleep, for the elephants was 1.6 (SE. = 0.9, N = 3) indicating prevalence of poor conditions, with 85% of ratings occurring below 4 (Figure 8).

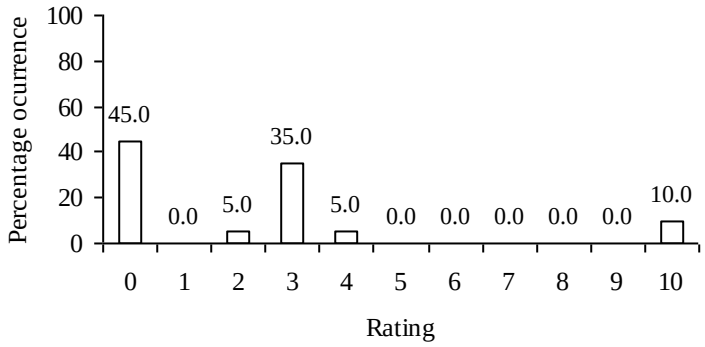
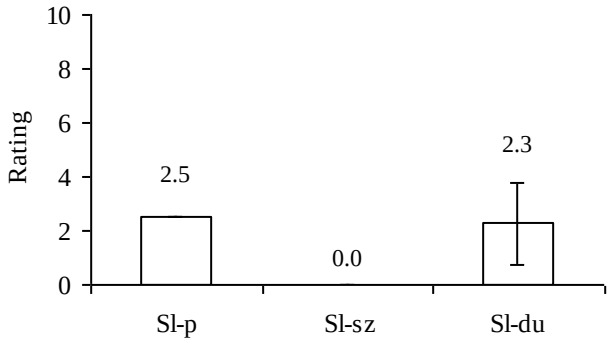


Figure 8: Percentage occurrence of rating for sleep for captive elephants in Mysore Zoo.

Shelter and sleeping place are the same, and hence the rating was similar which was 2.5 (SE = 0.0, N = 7) because all the animals have been confined to a radius of 10 to 12 ft. due to the practice of chaining. Elephants sleep for 4 h (Zepelin *et al.*, 2005), and any deviation from this is given low rating. The mean rating for sleep-related parameter (Figure 9) was 2.3 (SE = 1.5, N = 7) as four of the seven observed animals sleep for 6 to 11 hours.



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

Figure 9: Rating for sleep-related parameters for captive elephants of Mysore Zoo.

Walk and social interaction

- The animals, are allowed to walk within the enclosure (N = 7)
- Two elephants are taken for walks during the day as part of providing tourist rides

- The African elephants consisting of two adults and a sub-adult are reported to interact among themselves. However, the adult male has been kept isolated due to injury inflicted by the elephant on the adult female and sub-adult.
- The elephants were given opportunity for interaction (N = 8) except the African adult male and an orphaned young female (one month).

Opportunity for physical exercise and social interaction was rated. The absence of exercise among confined animals will lead to health problems. All the elephants are given an opportunity to walk, hence, the rating for walking was 10.0 (SE = 0.0, N = 10). Elephants are social animals (Sukumar, 2003) and their need for social interaction forms an integral part of their well-being. The mean rating was 6.7 (S.E. = 2.3, *N* = 3) implying prevalence of moderate conditions with 29% of ratings less than 5 (Figure 10).

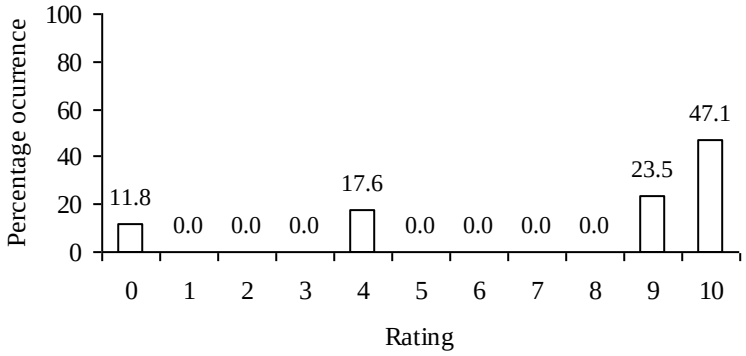
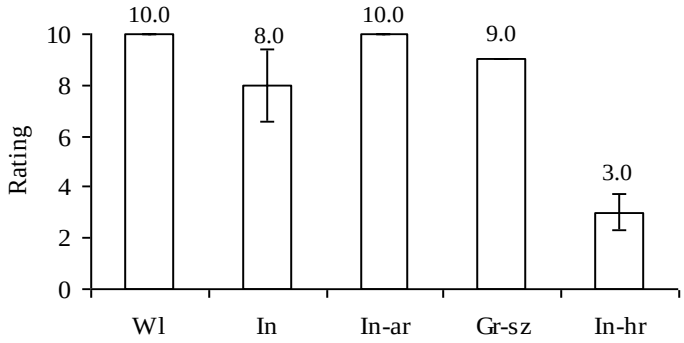


Figure 10: Rating in percentage for f social interaction among captive elephants in Mysore Zoo

The mean rating for the opportunity for interaction and interaction-related parameter (Figure 10) was 8.0 (SE = 1.4, N = 10) with only two elephants reportedly not allowed any interaction. High ratings are given for elephants with unrestricted access to social interaction. Mean rating for interaction (Figure 11) hours was 3.0 (S.E. = 0.7, N = 8) highlighting the prevalence of poor conditions.



Wl: Opportunity to walk In: Opportunity for interaction
In-ar: Area of interaction Gr-sz: Group size
In-hr: Interaction hours

Figure 11: Rating for walk and social interaction-related parameters for captive elephants of Mysore Zoo

Chaining

- Chain is tied in the leg region; for one adult male both hind legs were chained
- The mean chain weight is 39.8 kg (N = 4), size is 0.4 cm (N = 5) and length is 342 cm (N = 5)
- Chaining duration ranged from 14 to 16 h
- Only two elephants (aged 1.1 and 2.1 yrs) are allowed to range free at night

Captive elephants are subject to chaining for different durations and regions of the body. This parameter is rated considering the opportunity to range free, duration and region of chaining. Mean rating was 1.7 (S.E. = 0.9, N = 4) showing prevalence of bad conditions as 90% of the values fall within 0 and 1(Figure 12).

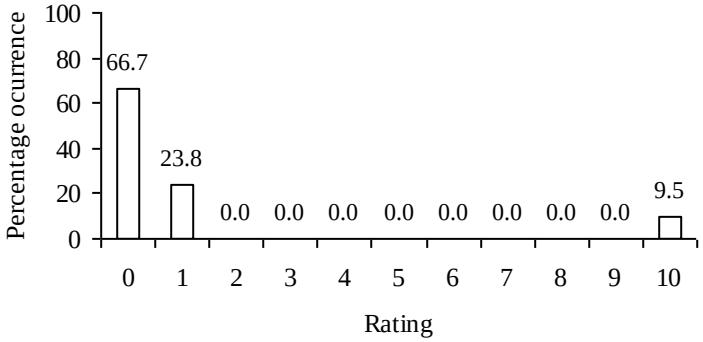
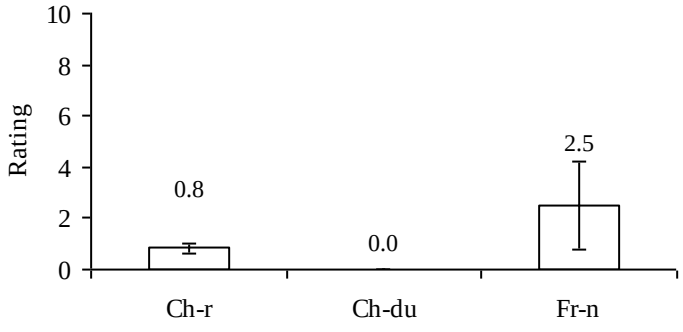


Figure 12: Percentage occurrence of rating for chaining of captive elephants in Mysore Zoo.

The use of chains in more than one region of the elephant's body is given low rating. Mean rating for chain-related parameters (Figure 13) was 0.8 (SE. = 0.2, N = 6) with one adult male being chained in both its hind legs. Mean rating for ranging free at night was 2.5 (S.E. = 1.7, N = 8) with two elephants allowed to range free.



Ch: Chaining status Ch-r: Chaining region
Ch-du: Chaining duration Fr-n: Free ranging at night

Figure 13: Rating for chain-related parameters for captive elephants of Mysore Zoo

Behaviour

- Seven elephants are calm; two adult elephants are aggressive to people; two adult male and female (African species) reported to have been aggressive to people

- None of the elephants exhibited stereotypic behaviour
- Adult male (African species) reported to be aggressive during musth

Temperament and observed abnormal behaviour, if any, are rated in terms of ease of handling the elephants and occurrence of stereotypy. Elephants that are calm/quiet and are easy to handle are given high rating. The mean rating for temperament was 7.8 (SE= 1.6, N = 9) with two elephants getting a rating of 0 due to their aggressive behaviour towards people. None of the observed elephants exhibited stereotypy. Hence, rating was 10.0 (SE = 0.0, N = 9).

Work

Except as display animals at the Zoo, elephants have no specific work; however, two adult elephants a male and a female are used for work, involving "20 to 30 rounds" of walking.

Food provisioning

- All the elephants are given only stall-feed in the enclosure
- Food: Grass, fresh grass, rice (*Oryza sativa*), coconut (*Cocos nucifera*), jaggery (sweet derived from sugarcane *Sacharum* sp.), ragi (*Eleusine* sp.) balls, sugarcane, greens, reed grass, paddy (unmilled rice), carrot, sugarcane, banyan leaves (*Ficus* sp.), straw
- Special food Milk, reed grass, carrot, sugarcane, ragi balls, rice for orphaned 1-month baby elephant
- Ration chart is used for all elephants
- For the injured female elephant (adult, African species), food given also included Dal (cooked pulses), grams, Kadle (peanuts/fried gram) Bengal gram

Availability and opportunity to feed on wide variety of food is considered along with husbandry practices such as hygiene of feeding place and maintenance of ration chart. The mean rating for this parameter was 6.2 (SE = 2.8, N = 4) with 40% occurrence of ratings scoring less than 5 (Figure 14).

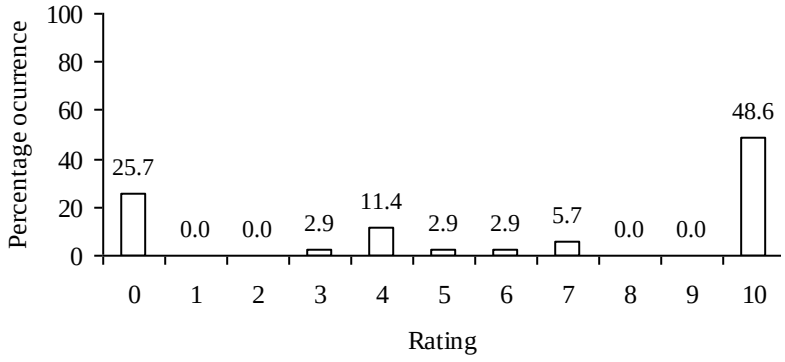
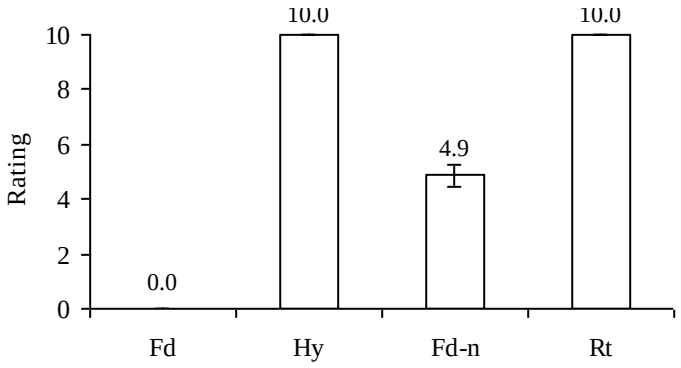


Figure 14: Distribution of rating for food among captive elephants in Mysore Zoo

Opportunity to range free to browse/graze in forest conditions is given high rating as elephants are known to feed on a wide variety of plants (Shoshani and Eisenberg, 1982). Mean rating for food-related parameter (Figure 15) was 0.0 (SE = 0.0, N = 9). The total number of foods provided is divided by a factor of two as these represent only stall-feed. This score is then considered as the rating for this sub-parameter. Mean rating was 4.9 (SE = 0.4, N = 9).



Fd: Food provisioning type Hy: Hygiene of feeding place
Fd-n: No. of food items Rt: Usage of ration chart

Figure 15: Rating for food-related parameters for captive elephants of Mysore Zoo

Reproductive status

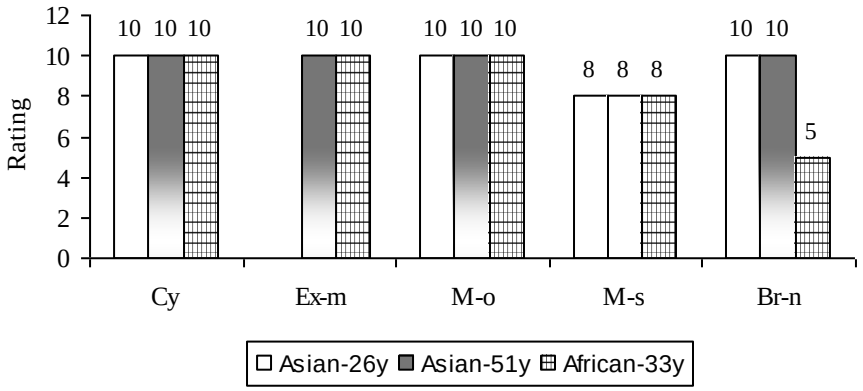
Female

- Three female elephants (age range: 26 to 51 yrs, two Asian and one African species) are cycling and are exposed to male elephants.
- All three elephants are exposed to captive males for breeding
- Total of eight births reported for the three elephants considered together
- Age at first birth: 17 yrs (Asian species) and 21 yrs (African species)

Male

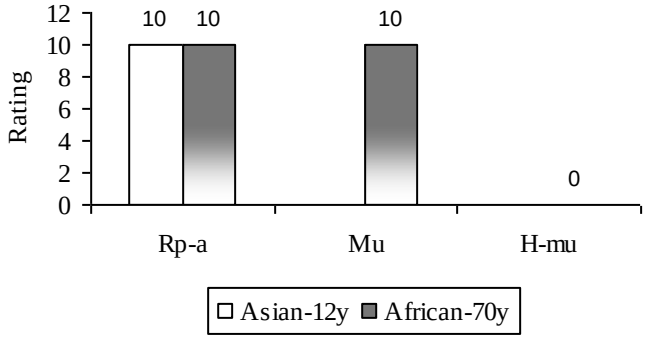
- Two elephants (age 12 yrs-Asian and 70 yrs- African) are active
- Musth reported for 70-yr old male, rough behaviour during this period, chained 24 hours, sired one male calf with the adult female (African species)

Reproductive activity of adult elephants is associated with good physical health (Kurt and Garai, 2007) and factors linked to captivity such as stress, obesity/malnourishment, absence of members of opposite sex, among other relevant causes (Clubb and Mason, 2002). The mean rating for reproductive status-related parameter (Figure 16) for females was 9.2 (S.E. = 0.4, N** = 14) and of male (Figure 17) it was 7.5 (S.E = 2.9, N** = 4). N** refers to the number of individual ratings across all sub-parameters observed.



Cy: Occurrence of oestrus cycles Ex: Exposure to males
M-o: Mating observed/not M-s: Male source
Br-n: Number of births

Figure 16: Rating for reproductive status-related parameters of female elephants in Mysore Zoo



Rp-a: Reproductively active/not Mu: Occurrence of musth
H-mu: Handling of musth

Figure 17: Rating for reproductive status-related parameters of male elephants of Mysore Zoo.

Health status and veterinary care

- Female elephant (African species), 33 yrs, injured following a fall into a trench
- Male elephant, 12 yrs (Asian species), blind in one eye
- Rescued calf (Asian species, one-month old) died
- All elephants de-wormed with various drugs at frequency ranging from once a month to once in three months
- Elephants vaccinated against HS and F&MV every year
- Oiling done on head/leg using castor oil/neem oil, new bullet weekly twice dung/urine/blood tests done

Captive conditions may lead to incidence of specific health issues such as foot problems (Mikota *et al*., 1994), excessive weight due to imbalance in available nutrition, exposure to diseases carried by livestock, etc. Mean rating was 9.1 (SE= 1.0, N* = 8) and 95% values fall in 10 rating (Figure 18) implying satisfactory conditions.

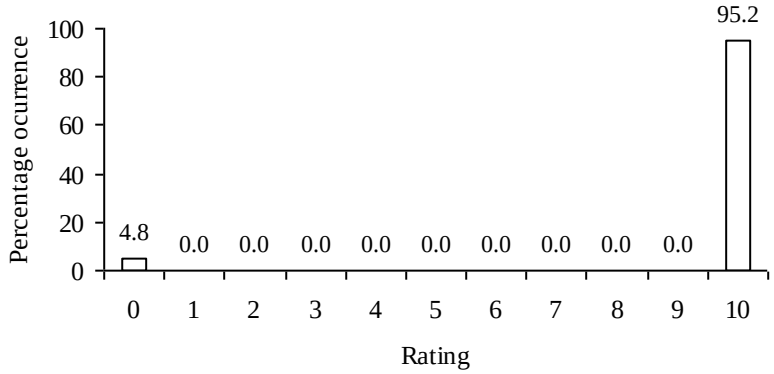
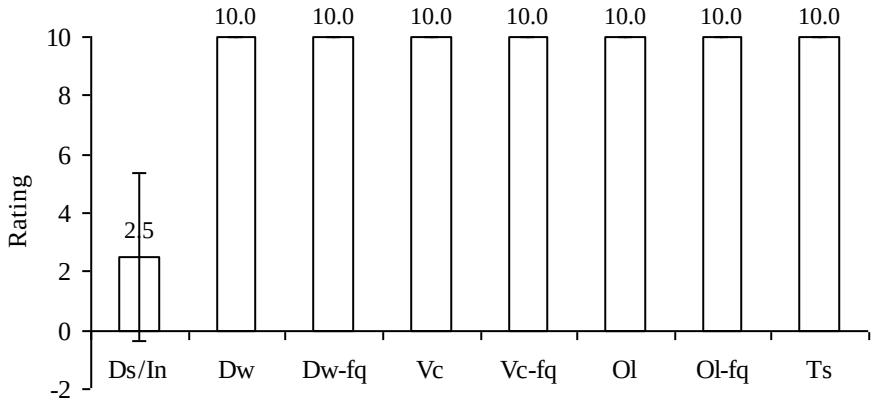


Figure 18: Distribution of rating for health and veterinary care for captive elephants of Mysore Zoo

Data on disease/injury is available for four of the 11 elephants (two Asian species and two African species. The mean rating for disease/ injury occurrence (Figure 19) was 2.5 (SE = 2.9, N = 4) with one rescued calf (aged 1 month) having died. Rating for de-worming was 10.0 (SE= 0.0, N = 10) showing that the practice of deworming is followed for all the elephants. All the elephants were vaccinated (some against Hemorrhagic septicemia (H.S.), some against H.S. and Foot and Mouth disease); hence, rating was 10.0 (SE= 0.0, N =10) for this sub-parameter. Samples of urine/dung/blood are tested, hence, rating was 10.0 (SE =0.0, N = 9).



D/In: Disease/ Injury occurrence
Dw: De-worming status
Dw-fq: De-worming frequency
Vc: Vaccination status
Vc-fq: Vaccination frequency
Ol: Oiling status
Ol-fq: Frequency of oiling
Ts: Tests of urine/dung/blood samples

Figure 19: Rating for health and veterinary care of captive elephants of Mysore Zoo

Veterinary personnel and infrastructure

- The elephants are treated by a veterinary doctor and two assistants
- Experience with elephants is 15 yrs, frequency of visit: daily, associated with zoo
- Veterinary facilities available: Laboratory, drug store, radiology, mobile x-ray, operation theatre
- Staff quarter is average

- Following facilities are available: cooking shed, cooking vessels, provision shed and animal stand
- Personnel included: Manager (1)and Cook (1)
- Birth, mating and treatment details of elephants are recorded

Timely veterinary care and availability of basic infrastructure can assist in good management. The mean rating for this parameter was 9.3 (SE = 0.8, N = 7) indicating occurrence of satisfactory conditions, 88% ratings fall within 10 (Figure 20).

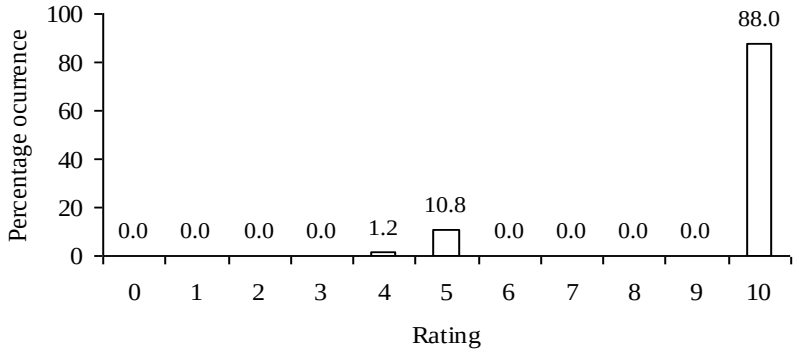
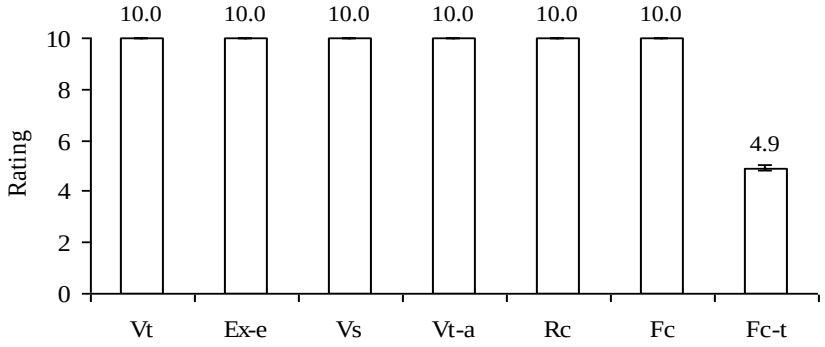


Figure 20: Distribution of rating for veterinary personnel and infrastructure of captive elephants of Mysore Zoo.

The mean rating for veterinary care (Figure 21) availability was 10.0 (SE = 0.0, N = 11) indicating the availability of a veterinary doctor for the care of the elephants. Infrastructure like staff quarters, cooking shed, animal stand, etc. has been rated and high rating shows availability of more than 75% of facilities. The mean rating for this parameter was 4.9 (SE = 0.1, N = 10).



Vt: Veterinary doctor availability Ex-e: Experience with elephants
Vs: Frequency of visits Vt-a: Veterinary assistant availability
Rc: Record maintenance Fc: Facility availability
Fc-t: Facility type

Figure 21: Rating for veterinary personnel and infrastructure availability for captive elephants in Mysore Zoo

Welfare status of mahout

- The mean age of mahouts is 33.2 yrs (SE = 4.9, N = 5)

- The mean experience in this profession is 15.7 yrs (SE = 6.9, N = 5)
- The mean experience with specific elephant is 2.9 yrs (SE = 1.1, N = 17)
- Of the five mahouts, two chose this profession as a means of employment
- Only one mahout did not belong to a tribal/Muslim community (N = 4)
- Only one mahout was not trained in this profession (N = 5)
- Education level ranged from 5th standard to SSLC
- The mean annual salary is Rs.39, 600 (ranging from Rs. 26,400 to 84,000). Excepting one, all mahouts are married (N = 5) with number of children ranging from 2 to 3
- Wooden stick/wooden ankush/stick is used as tool to control elephants (N = 5)
- Health check-up done by the Government (N = 4)
- Insurance cover available, amount ranging from Rs.50,000 to Rs. 1,00,000/-
- Two mahouts are said to have observed mating of elephants
- Alcohol is not consumed while at work (N = 4), only one mahout drinks after work

The welfare of handlers is assessed in terms of their socio-economic profile and experience in this profession. Percentage occurrence of overall rating, including socio-economic and experience-related parameters, showed 25% incidence of values less than 5 (Figure 22).

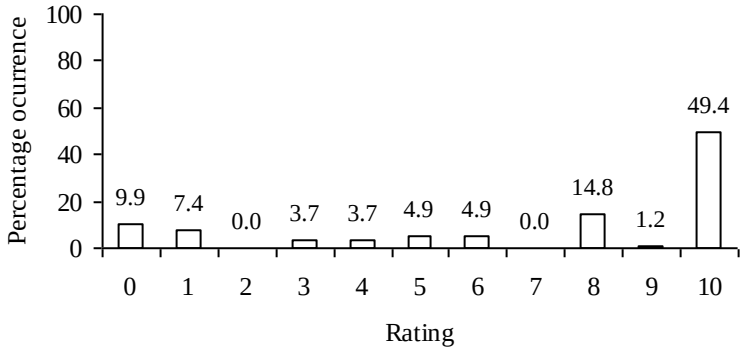
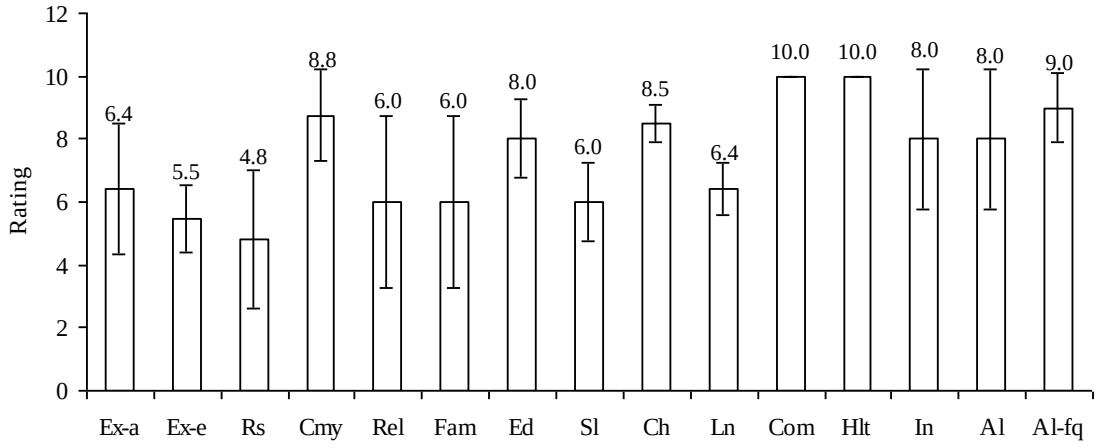


Figure 22: Percentage occurrence of overall rating for mahout of elephants of Mysore Zoo

Poor socio-economic status may influence the way the elephant is handled. The mean rating for this parameter was 7.6 (SE = 0.5, N** = 51) implying satisfactory conditions. (N** refers to number of individual ratings considered across all the sub-parameters for socio-economic status). Education level formed one of the parameters used for assessing socio-economic status and the mean rating was 8.0 (SE = 1.3, N = 4) showing three of the four mahouts had attended school up to 8th standard. Rating of 10 has been designed to represent a salary capable of supporting a family of four in an urban environment. The mean rating was 6.0 (SE = 1.2, N = 5) with only one mahout getting a satisfactory rating of 10. Alcohol consumption is a practice observed among some handlers. High rating represents absence of alcohol consumption. The mean rating was 8.0 (SE = 2.2, N = 5).

Professional experience was rated to assess the handler's relation with his/ her elephant. This was rated in terms of experience, capability and interest in the profession. Mean rating was 6.3 (SE = 0.7, N** = 30) showing prevalence of moderate conditions (N** refers to number of individual ratings across all the sub-parameters observed). Number of years in this profession is one indication of experience. Duration in the profession is expressed as percent of the mahout's age and is rated to indicate experience in the profession. The mean rating (Figure 23) was 6.4 (SE = 2.1, N = 5) indicating moderate conditions. The duration as a mahout with a specific elephant is rated as an indication of professional experience. The mean rating was 5.5 (S.E. = 1.1, N = 15) implying moderate conditions for this sub-parameter. Becoming a mahout owing to personal interest in the profession and having a tradition of handling elephants are given high rating. The mean rating is 4.8 (SE = 2.2, N = 5).



Ex-a: Experience (% of mahout age) Ex-e: Experience (% of elephant age)
Rs: Reason for choosing this profession Cmy: Community of mahout Rel: Having mahout relatives Fam: Family occupation Ed: Education status
Sl: Salary given Ch: Number of children Ln: Number of languages known
Com: Knowledge of commands Hlt: Health check-up status In: Insurance cover availability
Al: Alcohol consumption Al-fq: Consumption frequency

Figure 23: Rating for welfare parameters of the mahout.

Overall mean rating for elephants was 6.9 (SE = 0.2, N = 406) showing prevalence of moderate conditions. Overall mean rating (excluding veterinary parameters) was 5.7 (SE = 0.2, N = 270 N refers to number of individual ratings across all sub-parameters observed). The occurrence of 10 scores in 42% of the cases (Figure 24) in the overall rating (excluding veterinary and health parameters) shows existence of satisfactory conditions to this extent. The occurrence of 10 scores was 59% when veterinary and health parameters are included (Figure. 24).

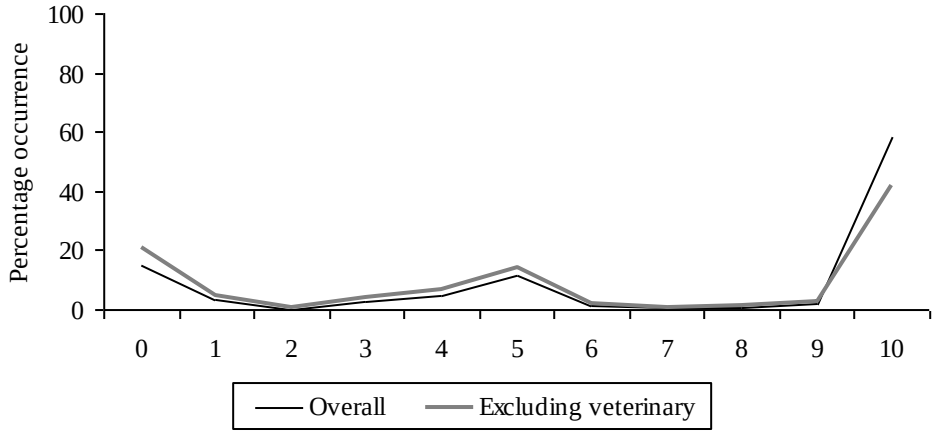


Figure 24: Comparison of percentage of overall rating for elephants

Discussion

Overall mean rating of 6.9 for elephants indicates the prevalence of moderate conditions. This rating measures the difference between living conditions in captivity and those in the wild as well as provision of suitable veterinary management. Setting veterinary parameters aside, as some health issues of the elephants could be a consequence of captivity, the mean rating can provide a profile of captive conditions by itself. Excluding veterinary parameters, the overall mean rating of the Zoo was 5.7.

The occurrence of scores of 10 in the overall rating in 42% of the cases indicates that satisfactory conditions prevail here to this extent. However, a feature of this survey is the use of "presence–absence" type rating with only two values: 10 or 0. Such ratings formed 42% of all the sub-parameters assessed, with scores of 10 from such sub-parameters contributing 39% to the overall rating, indicating the presence of suitable features. However, with greater availability of information about a particular parameter, percentage occurrence of scores of 10 may reduce with consequences on the overall rating.

The World Zoo Conservation Strategy (1993) states conservation of the behavioural repertoire of wild animals along with conservation of a species as being important by having features which encourage the expression of species-typical behaviour in zoo enclosures. Some aspects of the zoo not conducive to the elephants' species-typical way of life were:

- Wild elephants have been reported to travel long distances as they forage/search for mates/companions (Poole and Moss, 2008). Mysore Zoo elephants are provided a large enclosure, measuring 4 acres. However, all except for two elephants (less than three years old) are chained overnight. This practice along with provision of stall-feed frees up the time available for the animals. Elephants are said to forage for nearly 12 to 18 hours per day looking for their favoured

vegetation (Sukumar, 2000). The absence of any "occupational variables" (Kane *et al.*, 2007) may lead to poor conditions. The use of browse (Kane *et al.*, 2005) and staggered feeding times (Kinzley, in press) have been recommended to aid in providing a more enriched environment for confined animals.

- Absence of free-ranging feed amid suitable and varied habitat, elephants forage and feed on diverse vegetation (Sukumar, 2000), engaging in activities such as manipulating food using their trunk, tusks and feet (Kurt and Garai, 2007). Young captive-born elephants need an opportunity to learn foraging for suitable food from their con-specifics (Kurt and Garai, 2007). Such activities/opportunities are deficient in the Zoo.

- Sleep duration: Elephants sleep only for 3 to 4 hours/day (Kurt and Garai, 2007). Excessive sleeping could be attributed to ill-health or captivity-imposed factors. Kurt and Garai (2007) observed longer sleeping duration among orphaned elephants with retarded body growth in an elephant rescue center. These elephants also integrated, less/none at all, socially into any group. In Mysore Zoo, except for three elephants, mean sleeping duration for adult animals ranged from 5 to 6 hours while the duration for young animals ranged from 8 to 11 hours.

- Reproduction: Mysore Zoo elephants have a successful history of elephant births (Krishnamurthy and Wemmer, 1995). The existing elephants also seem to have given birth. Despite this success and the time-span of its occurrence, the number of elephants has not increased. This may be due to transfer of elephants across institutions/individuals, a fact borne out by the presence of two African elephants in the Zoo which were received in exchange from Germany (former West Germany). Clubb and Mason (2002) cite studies on the negative effects of removal/introduction of elephants/social animals from a group. Early separation of dependent young from a group can result in trauma (Bradshaw, in press).

Zoo features conducive to elephants:

- Availability of veterinary care is satisfactory as doctors and assistants are available, veterinary schedules for the elephants are followed and facilities (laboratory, clinical facility, etc.) exist.

- Related individuals in elephant groups: The present group structure of elephants included mother–offspring pairs; three in number. It is reported that the social structure of elephants revolves around protection, care and nurture of infants (Kinzley, in press), occurrence of family groups of mother dependent offspring (Vidya and Sukumar, 2005), allo mothering among unrelated individuals, in captivity, in the presence of young elephants (Gadgil and Nair, 1982).

  Maintenance of herd structure consisting of related individuals is considered to be of immense importance, in conjunction with adequate space, for animals in captivity (Kane *et al.*, 2007).

Mahout

The mean rating for mahouts is 7.1 when both socio-economic and professional status are pooled together. This rating implies occurrence of satisfactory conditions.

Parameters for mahout welfare with ratings of less than 5:

- Experience of mahout with specific elephants: The mean duration with specific animal is only 2.9 years, ranging from three months to 18 years. This accounted for only 30% of experience when calculated as proportion of elephant's age, implying change of mahouts. Assuming the attitude of the mahouts towards his elephant to be average (on a scale of good to bad), frequent change of mahouts involves a period of learning and development of a bond between man and animal. This maybe stressful for both.

It should be noted that the Mysore Zoo has witnessed incidents of poisoning resulting in the death of its elephants (two adult females and an adult male) in the year 2004; forensic reports also confirmed them. Such incidents point towards the vulnerability of elephants to human action in the absence of vigilance/care among employees.

References

1. Anonymous. (1993). The world zoo conservation strategy. The role of the zoos and aquaria of the world in global conservation. Publication of The World Zoo Organization (IUDZG) and The Captive Breeding Specialist Group of IUCN/SSC. (accessed online: http://www.waza.org/conservation/wczs.php)
2. Bradshaw, G.A. (in press). Inside looking out: Neuroethological compromise effects in captivity. In: An Elephant in the Room: the Science and Well Being of Elephants in Captivity. pp: 55–68. (referred online http://www.loudmonks.com/)
3. Clubb, R. and Mason, G. (2002). A review of the welfare of zoo elephants in Europe: A report commissioned by the RSPCA. Oxford, U.K., University of Oxford, Animal Behaviour Research Group, Department of Zoology.
4. Kane, J.D.L., Forthman, D., and Hancocks, D. (2005). Optimal Conditions for Captive Elephants: A Report by the Coalition for Captive Elephant Well-Being.
5. Kane, J.D.L., Forthman, D., and Hancocks, D. (2007-updated). Appendix. Optimal Conditions for Captive Elephants: A Report by the Coalition for Captive Elephant Well-Being. In: An Elephant in the Room: the Science and Well Being of Elephants in Captivity. pp: 246–279. (referred online http://www. loudmonks.com/)
6. Kinzley, C. (in press). Applied behaviour research: a tool in elephant management. In: An Elephant in the Room: the Science and Well Being of Elephants in Captivity. pp: 177–180. (referred online http://www.loudmonks.com/)

7. Krishnamurthy, V. and Wemmer, C. (1995). Veterinary care of Asian timber elephants in India: historical accounts and current observations. Zoo Biology **14**: 123–133.
8. Kurt, F. and Garai, M.E. (2007). The Asian elephant in captivity—a field study. Foundation books, Cambridge University Press, New Delhi.
9. Mikota, S.K., Sargent, E.L., and Ranglack, G.S. (1994). Medical management of the elephant. Indira Publishing House, U.S.A.
10. Poole, J.H. and Moss, C.J. (2008). Elephant sociality and complexity. The scientific evidence. In: Elephants and ethics toward a morality of coexistence (Eds: Wemmer, C and Christen, C. A) The John Hopkins University Press, Baltimore. (accessed online: http://www.elephantvoices.org/index.php?topic=tools&topic2=tools/documents/2_Poole_Moss_Final_7_12_06.pdf).
11. Shoshani, J. and Eisenberg, J.F. 1982. *Elephas maximus*. Mammalian species.**182**: 18.
12. Sukumar, R. (2000). Asian Elephant (*Elephas maximus*). In: Reading, R.P. and Miller, B. (eds). Endangered Animals: a reference guide to conflicting issues. Greenwood Press, Westport, Connecticut, London, pp. 34–39.
13. Veasey, J. (2006) Concepts in the care and welfare of captive elephants. Int. Zoo Yb. **40:** 63–79
14. Zepelin, H., Siegel, J.M. and Tobler, I. (2005). Mammalian Sleep. Accessed online: http://www.npi.ucla.edu/sleepresearch/Mammalian_Sleep.pdf

Section 4
Captive elephants of temples of Karnataka State

Executive summary

The study aims at assessing the welfare status of captive elephants maintained by temples across different districts of Karnataka. These elephants were sampled to record morphometric observations of the animal, their physical environment, occurrence of stereotypy, health status, and management practices adopted regarding feeding, bathing, work type and other daily routines.

The investigation quantifies the welfare status of the captive animals by recording their physical, physiological and behavioural environment through a number of parameters. Relevant data on the animal handlers is also collected and assessed. Each of these parameters was rated on a scale of 0 to 10 with 10 representing ideal living conditions for the animal as experienced by it in its wild state. 0 represents the worse possible situation for that parameter.

Thirty two elephants were observed across different temples in Karnataka. Mean age was 23 years. They included five males and 27 females. Mean rating for source of animal was 2 suggesting that the captive animals were most often purchased or exchanged or gifted.

Twenty one elephants were sourced from the Forest Department. Mean rating of 0.0 for type of previous owner indicates change from a previous semi-natural state to the present unnatural conditions.

The most common type of shelter is a wall with sheet cover followed by concrete/stone structures; some are tied under tree(s). Eighty percent of the shelters have stone or concrete floors, the elephants are chained for an average of 14.9 h/day, and the duration ranged from 3 to 22.5h/day**.** The overall mean for shelter was 3.14 averaged across the sub-parameters.

Sixty percent of the elephants were provided water from taps, while 30% were given from more than one source and only 3% had access to rivers. The overall mean for water was 6.0 indicating provision and availability of less than ideal conditions.

Overall mean rating for opportunity to sleep in a suitable place for sufficient duration was 4.0 implying less than ideal conditions for sleep.

Observed elephants were walked on a range of terrain: on roads in cities and towns, near crop fields, around temples, within a sugar factory and in forest conditions. Mean distance covered while walking was 8 km ranging from 1 to 30 km. Mean rating for walk was 6.0 indicating the absence of free-ranging for walk or walking in unsuitable conditions such as tarred roads or stone.

Sixty six percent of the elephants were allowed to interact with other animals. Mean duration of interaction was 11 h ranging from 0 to 24 h, with 50% of the elephants interacting for less than three hours. Overall mean for interaction was 7.0 indicating occurrence of moderate conditions for interaction and related features.

Sixty two percent of the observed animals exhibited stereotypy such as swinging head, body movement to and fro, shaking head, moving head and trunk, etc. Mean rating for the occurrence of stereotypy is 4.
The animals performed work related to the temple such as standing in front of temple, blessing devotees, garlanding, participating in processions, bringing water from the river, etc. for a mean duration of 2.8 h with a range of 0.5 to 7.5 h. Mean rating was 1.0 and all the ratings were less than 3.0.

Eighty percentage of the animals were stall-fed while only 7% were allowed to range free. The food provided included rice (*Oryza* sp.), ragi (*Eleusine* sp.), jaggery (sweet liquid derived from sugarcane (*Saccharum* sp.), horsegram (*Dolichos* sp.), bamboo leaves (*Bambusa* sp.), grams, variety of greens, palm leaves (Family Arecaceae), maize (*Zea mays*), straw, coconut (*Cocos nucifera*), boiled rice and sweets like *payasam (viscous milk pudding), prasadam (sacred offering), kadubu (fried; wheat flour, jaggery and dry coconut based sweets)* etc. Mean rating for food-related parameter was 2 with 77% of the elephants getting a rating of 0.

Chaining and imposition of restriction on the animal's movement is a widespread practice. Overall mean rating for chaining-related parameter was 0.02 showing occurrence of bad conditions for this feature.

Seventy one percent of the elephants were not cycling and exposure to males was only 19%. Overall mean rating for reproductive status was 2.7; individual overall mean ratings ranged from 0.0 to 10.

Disease/injury occurrence was 81% with foot-related problems appearing in 44% of the elephants; the overall mean rating was 5.0

The overall mean rating for mahouts, assessed across 15 parameters, was 7.0 and 5.0 for cawadis. Their overall mean rating indicates that the welfare status falls in "moderate" category.

The mean rating across all the parameters was 4.0. Only 34% of the ratings ranged from 7.5 to 10. Overall rating value of elephants in the temples observed was 3.0 implying adverse living conditions.

Introduction

Elephants have been depicted in temple architecture as a hoary tradition, the practice of keeping elephants in temples maybe equally ancient. Notwithstanding the long, perhaps well-established methods of elephant keeping in temples, their living conditions (physical and psychological) have found little mention in texts. This is significant considering the distribution of elephant keeping temples in this state. In relation to other interest, temples appears to use elephants specifically for the religious significance and, unlike some of the other institutions, the agenda of keeping elephant in temples has never been for any commercial interests. However, due to rigorous financial crisis relating towards running the temple administration, some of the temples are not in a position to manage elephants there. This leads to handlers or others associated with the temple, to force the elephants to generate resources for them, their family and for itself. Utilizing elephants for commercial interests and the unnatural environment provided to elephants while they are being in temple or forced for generating its own resources make the management of elephants in temple more challenging.

Objective

The study aims to assess the welfare status of captive elephants maintained by temples across different districts of Karnataka. Welfare status of an animal is affected by deviation in terms of living conditions, social environment, freedom of choice and performance of natural behaviours as experienced by their wild counterparts. The study aims to quantify the welfare status of the captive animal by recording their physical, physiological and behavioural environment through a number of parameters. Relevant data on the animal handlers is also collected and assessed.

Method

Elephants maintained by temples across different districts were sampled to record their morphometric, their physical environment, occurrence of stereotypy, health status, management practices adopted regarding feeding, bathing, work type and other daily routines. Each of these parameters is rated on a scale of 0 to 10 with 10 representing ideal living conditions for the animal as experienced by it in its wild state and 0 the worse possible situation for that parameter.

The suitability of a parameter depended on the replication of near-natural conditions for the animal. The more the deviation from this state, the lesser is the rating.

Ratings were graded in the following manner:

- 0 to 2.4: bad
- 2.5 to 4.9: poor
- 5.0 to 7.4: moderate
- 7.5 to 10.0: satisfactory

Each parameter was studied in terms of sub-parameters. Sub-parameters have been averaged to give the overall mean for that particular parameter. For instance, the shelter provided to the animal was sub-divided into a number of factors such as: (i) shelter type

whether the shelter was made of asbestos sheets or concrete or natural materials, (ii) shelter size and (iii) floor type.

A shelter made of asbestos sheet was given a lower rating than that made of natural materials as asbestos sheets tend to be less conducive to extreme variations in temperature than shelters with thatched roof. A shelter with natural forest conditions is given higher value than one with a thatched roof. Wherever possible, ratings have been compared for statistical significance.

Of the 73 sub-parameters, data was collected for 56 % of the variables, ranging from 22.53 to 82.5. The result depicting percentage occurrence of rating from 0 to 10 uses rounded- off values, with each number being considered in the continuum from 0.4 to 1.4. For a value such as 8, all rating values from 7.5 to 8.4 are included.

Results

Population status

Thirty two elephants were observed across different temples in Karnataka. Mean age was 22.7 yrs (SE = 0.13, N = 27) which included five males and twenty seven females. Mean age for female elephants was 24.13 yrs (SE = 0.16, N = 23) ranging from 9 to 51 yrs. Mean age for males was 14.6 yrs (N = 4) ranging from 11 to17.5 yrs.

Origin of the captive elephant

Twenty eight elephants were said to have been purchased/gifted or exchanged with the mean age being 8.9 yrs (SE = 0.16, N = 21). One particular elephant, (a female, belonging to Maridevara Mutt), was purchased at the age of just 3 yrs. Following this, it seems to have been shifted to three different temples, inclusive of the present location. Its previous wild state or having been born in captivity has been rated. Those born in captivity have been rated higher than all other types as it indicates reproductive health of the captive mother. Those that have been captured from the wild have been given low scores (Figure 1). Mean rating value of 2.4 (SE = 0.03, N = 19) shows that the captive animals were most often purchased or exchanged or gifted (94.7%). Nearly 6% of the animals have been brought in by capture from the wild.

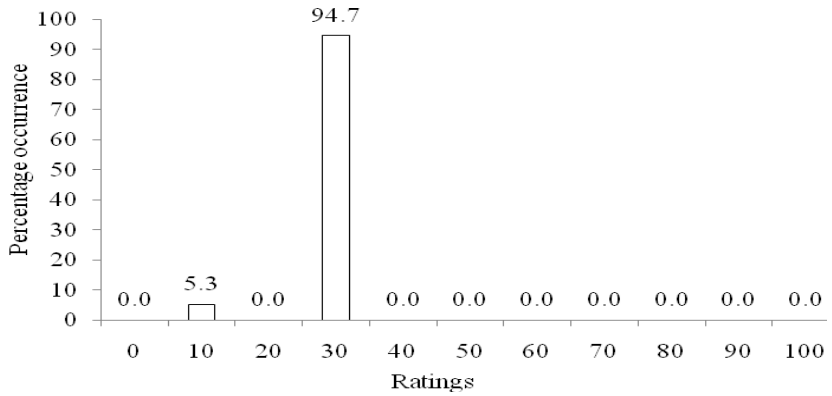


Figure 1: Percentage occurrence of ratings for origin of elephants in temples of Karnataka

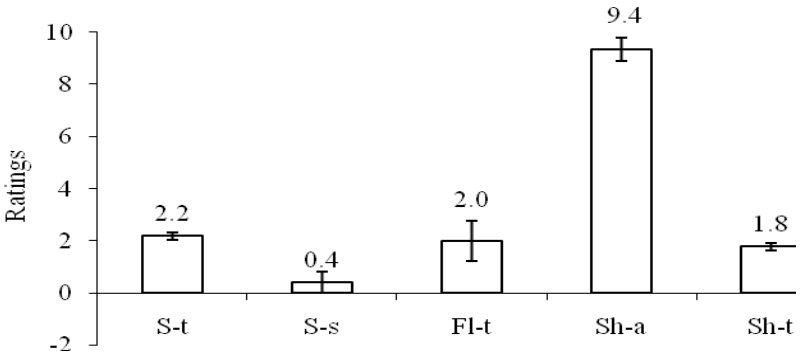
Type of previous owner

The available data shows that 21 elephants were sourced from the Forest Department. The change in conditions experienced by the elephant from a natural state to a semi-natural one or vice-versa or to an unnatural environment was rated by collecting data on the previous owner. High values indicate change from unnatural to semi-natural conditions with ideal management conditions, facilities and expertise. Low values show change from semi-natural to unnatural conditions. Mean rating value of 0.0 (SE = 0, N = 18) indicates change from a previous semi-natural state to the present unnatural conditions.

Shelter

- The most common type of shelter is a wall with sheet cover (N = 16) followed by concrete/ stone structures (N = 4). Four elephants were tied under tree(s). One female of Sirigere Temple was housed in a godown while a 17.5yrs, male, of Samson Distilleries, Davanagere, was housed in the distillery/sugar factory premises or tied below a tree.
- Mean shelter size was 388 sq m (SE = 327.8, N= 25), ranging from 2.36 for an adult female, belonging to Sri 108 sq m Acharya Keshu Bhusan Trust to 8,094 for adult female, belonging to Maridevara Mutt.
- Eighty percent of the shelters (N = 30) had stone or concrete floors and the animals are chained for an average of 14.9 h/day (SE = 0.8, N = 21). The duration of chaining ranges from 10 h/day to 24 h
- Shade from trees/forest is available for ten elephants observed. Shade is available from asbestos sheets for 5 animals and from concrete/stone buildings for three animals. One adult female of Nanjundeshwara Temple is kept in front of the temple in the open from 6 to 10 a.m. A male elephant belonging to Shirur Temple is exposed to the sun during daytime.

Parameters related to shelter have been rated using five sub-parameters (Figure 2). The overall mean for shelter was 3.14 (SE = 1.7, N = 5), averaged across the sub-parameters.



S-t: Shelter type/ enclosure S-s: Shelter size Fl-t: Floor type
Sh-a: Shade availability Sh-t: Shade type

Figure 2: Rating for shelter-related parameters of captive elephants in temples of Karnataka.

- Overall shelter rating of 0.0 for the elephant one adult female, belonging to Sri Jagadguru Pakkireshwara Samsthana Mutt, Gadag, as the elephant does not have any enclosure/shelter and there is no provision of shade.
- Overall shelter rating of 7.5 for one adult female, belonging to Sri Rambhapuri Mutt, as the elephant had access to earthen flooring and tree shade. However, its shelter is open, under a tree.

Distribution of ratings for elephants in temples is presented in Figure 3; values less than 4.0 contributed 80%, and 20% scored 10.

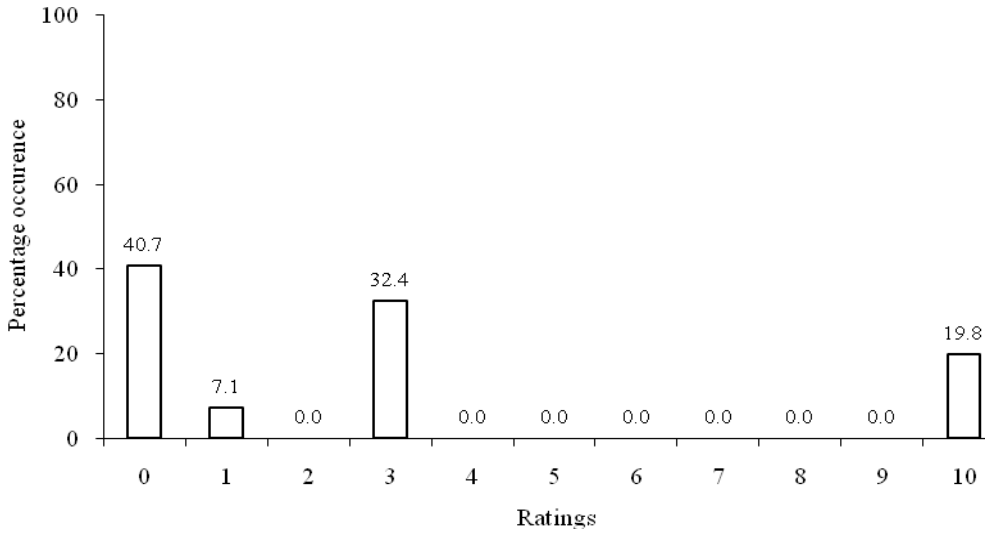


Figure 3: Distribution of ratings for captive elephants in temples of Karnataka

Mean rating for shelter type was 2.2 (SE = 0.15, N = 32) showing use of a structurally enclosed space as shelter for the captive animal. The low rating also reflects the restriction imposed on the movement due to the nature of the shelter. A rating of 0 is given to the elephants belonging to Sri Jagadguru Pakkireshwara Samsthana Mutt, (Gadag), Mukti Mandir Dharma Kshetra (Gadag), and to Samson Distilleries (Davanagere). The rating indicates absence of shade in the shelter and no man-made enclosure.

Shelter size available, a related sub-parameter, was rated with the maximum value given to the animal allowed to range free and lower values for any size less than 5000 sq m. Mean rating was 0.40 (SE = 0.40, N = 25) with just one female, belonging to Maridevara Mutt being given a rating of 10 for shelter size. Chronic exposure to unsuitable hard substrate leads to foot problems in the animal. In this context, flooring which is similar to natural conditions has been given a higher rating. Mean rating for floor type was 2.0 (SE = 0.75, N = 30) with 80% of the elephants exposed to hard substrates; 66.7% of the animals exposed to concrete floors have foot/leg injury. Only six elephants belonging to six temples were given a rating of 10 indicating provision of suitable floor type Shade assumes importance as captive elephants are normally restricted in their movements. Mean rating was 9.4 (SE = 0.45, N = 31) with 94% of the elephants getting a rating of 10

indicating the availability of shade. Only two elephants, one of Sri Jagatguru Pakkireshwara Samsthana Mutt (District Gadag) and the other of Mukti Mandir Dharma Kshetra (District Gadag/Dharwad) get a rating of 0 showing the absence of shade.

Water and related parameters

- Sixty percent of the elephants get water from taps, while 30% get from more than one source (N = 30). Only 3% have access to river water as a drinking source.
- Mean number of times the elephants drink is 3.1 (SE = 0.13, N = 30) ranging from 2 to 5 times/day. Mean quantity of water drinking per day was 156 (SE = 19.1, N = 28) ranging from 12 to 325 l/day. One female, drank fewer times as the water was salty. Three temples had created artificial ponds for their animals.
- Twenty eight percent of the elephants are bathed using tap/well water, 25% use tank/lake/ ponds.
- Mean bathing duration of bath was 1.8 h (SE = 0.18, N = 30) ranging from 0.13 to 3.5 h. Ninety eight percent of the elephants were given a bath of less than four-hour duration. Only six elephants bathed for 3 h. Different materials were used as scrub: brush, stone, brick, and naturally available substances like coconut fibre. Only six percent of the temples used coconut brushes. Fifty percent used stone or brush and 34% both brush and stone (N = 32) and soap was also used for two elephants one with the temple Sri Devi Annapoorneshwari Kshetra and the other with Nanjundeshwara Temple, Nanjangood, Mysore.

Water related parameter has been rated using six sub-parameters (Figure 4). The overall mean for water was 5.83 (SE = 1.03, N = 6) indicating less than ideal conditions.

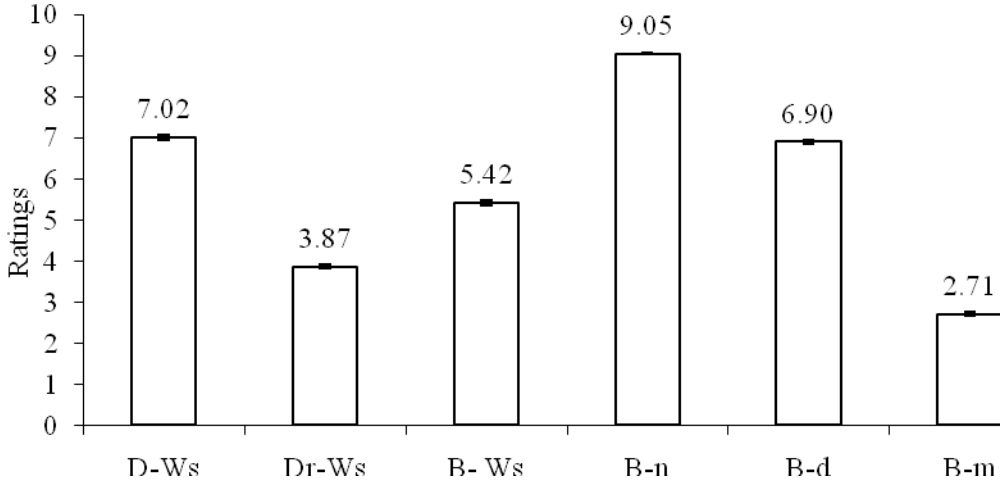


Figure 4: Ratings for water-related parameter for elephants in temples of Karnataka

- Rating of 2.33 was given for a female, belonging to Shri Maralu Siddeshwara Temple: source of drinking/bathing water was 2 km which raises the possibility of

inaccessibility to water when the elephant needs it as she is said to be chained for 16 h. Also, the rating reflects the use of unsuitable scrubbing material while bathing.

- Rating of 7.67 was given for a female, belonging to Sri Devi Annapoorneshwari Temple: relatively higher scores have been given as the animal is given the recommended duration of bath, for materials used for scrubbing and for distance to water source. However, drinking water source needs to be improved as it is from a tap and is not always accessible to it.

Distribution of ratings for temple elephants shows that (Figure 5) the ratings of 34% of the ratings were less than four and 32% were greater than 8.0.

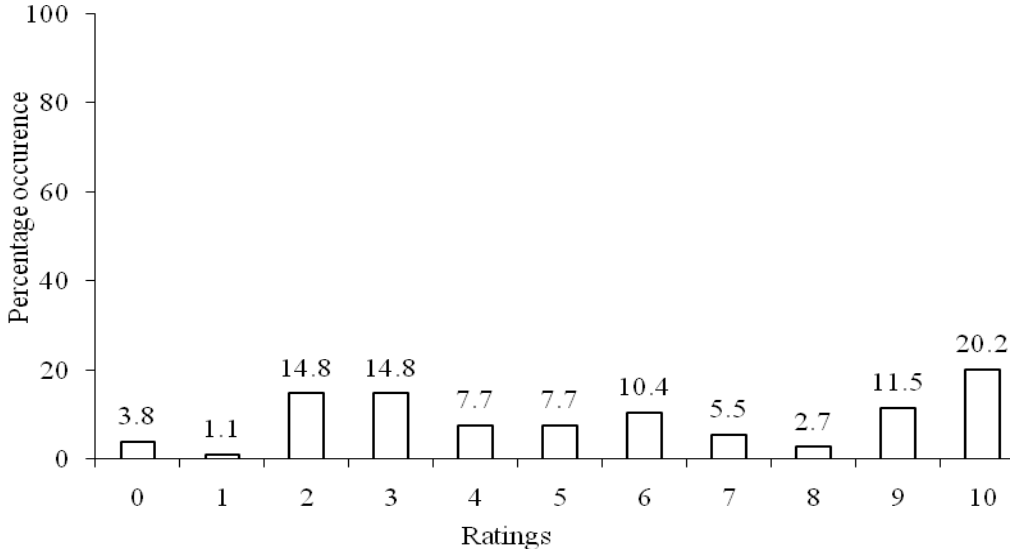


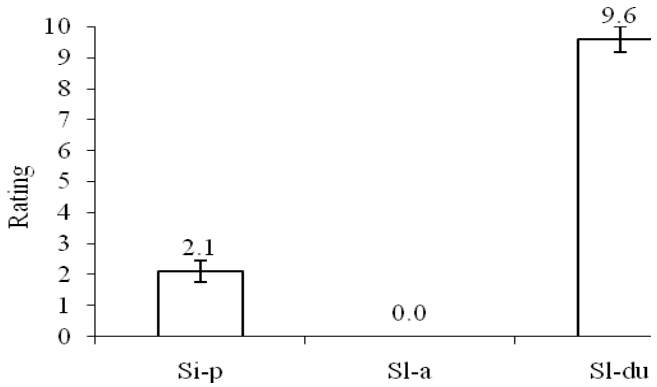
Figure 5: Distribution of ratings for captive elephants of temples of Karnataka

- Source of drinking water, is rated based on the availability of free-flowing water. Mean rating was 3.9 (SE = 0.34, N = 30) showing the use of small water bodies like tanks/ponds and tap water by 80% of the sampled places. Elephants belonging to Sri Kukke Subramanya Temple, were given a rating of 10 as the source of water is a river.
- Mean rating for bathing water source was 5.4 (SE = 0.45, N = 31) implying provision of larger sources of water like lakes or reservoirs with only 16% of the temples using rivers as a source.
- Materials such as plastic brush or brick which are hard and maybe abrasive to the skin have been given lower rating. Mean rating was 2.7 (SE = 0.4, N = 31) indicating the use of hard material for scrubbing. The elephants, belonging to Sri Devi Annapoorneshwari Temple and Kateel Sri Durga Parameshwari Temple, Mangalore get a rating of 10 as coconut fibre is used for scrubbing.

Sleep and related parameters

- Of the 31 observations on sleeping place, 65% were reported, unambiguously, to use the shelter as the sleeping place. Mean sleep duration was 5.9 h (SE = 0.4, N = 23) ranging from 1.5 to 12 h. Ninety-one percent of the elephants slept at night.

Giving the elephant an opportunity to sleep in a suitable place for sufficient duration was rated. This was measured over three sub-parameters (Figure 6). Overall mean rating was 3.9 (SE = 3.57, N = 3) implying less than ideal conditions for sleep.



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

Figure 6: Ratings for sleeping-related parameters for captive elephants in temples of Karnataka

- Elephants with rating less than 3 were from Suttur Mutt, Mysore and Samson Distilleries, Davanagere

Distribution of ratings (Figure 7) of sleep-related parameters show that 25% ratings fall below 4.0.

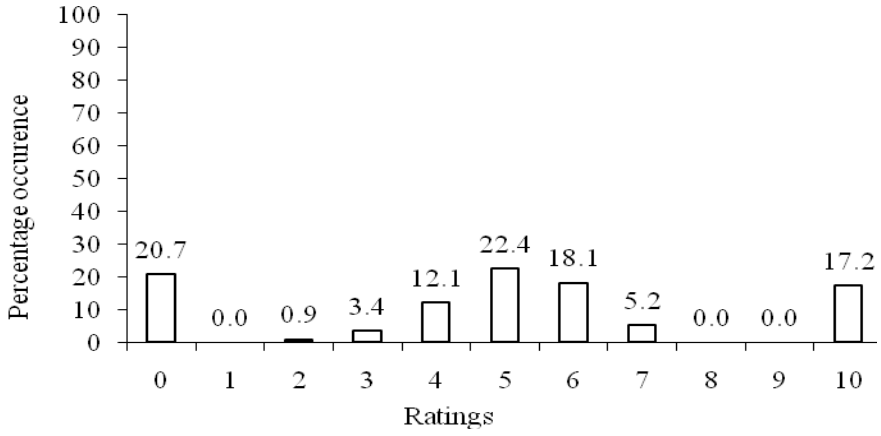


Figure 7: Distribution of ratings for sleep-related parameters for captive elephants of temples of Karnataka

- The place where the animal is allowed to sleep has been rated for its suitability on a scale similar to that of the type of shelter. Mean rating was 2.1 (SE = 0.34, N = 31) with values ranging from 0 to 4 indicating the use of non-natural materials for the place or keeping the animal restricted in its movement by chaining it.
- Mean rating assigned for the size of sleeping place was 0.0 (SE = 0, N = 12) indicating small size of the animal's sleeping place.

- Mean rating for sleep was 9.6 (SE = 0.41, N = 21) implying sufficient sleep for the animal. Only one elephant, a 14yrs male of Suttur Mutt, Mysore, scored 1.5 indicating less than adequate duration of sleep.

Walk and related parameters

- Observed elephants walked on a range of terrain: on roads in cities and towns, near crop fields, around temples, within a sugar factory and in forest conditions. One male elephant, walked for 6 km between Haragere and Alkanoor begging for fruits and vegetables from the market.
- Mean distance covered while walking was 8.21 km (SE = 1.35, N = 29) ranging from 1 to 30 km.
- Elephants belonging to Shirur Temple and Saundatti Yellamma Temple walked 1 km.
- Elephants belonging to Bichali and Suttur Mutt, Mysore, walked 30 km a day.
- Mean walking duration was 3.8 h (SE = 0.43, N = 30) ranging from 1 to 10 h.
- A female, belonging to Sringeri Temple walked for 1 h and a female, belonging to Sri 108 Acharya Keshu Bhusan Trust walked for 10 h.

Allowing the elephant to walk on suitable terrain or time of day is significant as they are subjected to long periods of inactivity or unnatural activity. Mean rating for allowing to walk was 5.5 (SE =0.27, N = 31) indicating the absence of free ranging for walk or walking on unsuitable conditions such as tarred roads or stone.The elephants belonging to three temples Sri Rambhapuri Mutt, Hombuja Jain Mutt and Suttur Mutt, Mysore were given a rating of 10 and the rest of the elephants (90%) got a rating of 5.0. Mean rating (Figure 8) for time of day for walking was 3.2 (SE = 1.2, N = 14) implying being made to walk during late morning or early evening hours on natural terrain. Ratings ranged from 0 to 10 with 57% of the elephants getting a rating of 0.

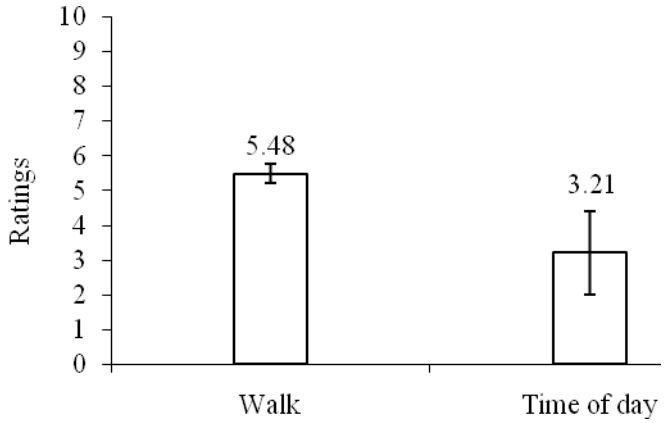


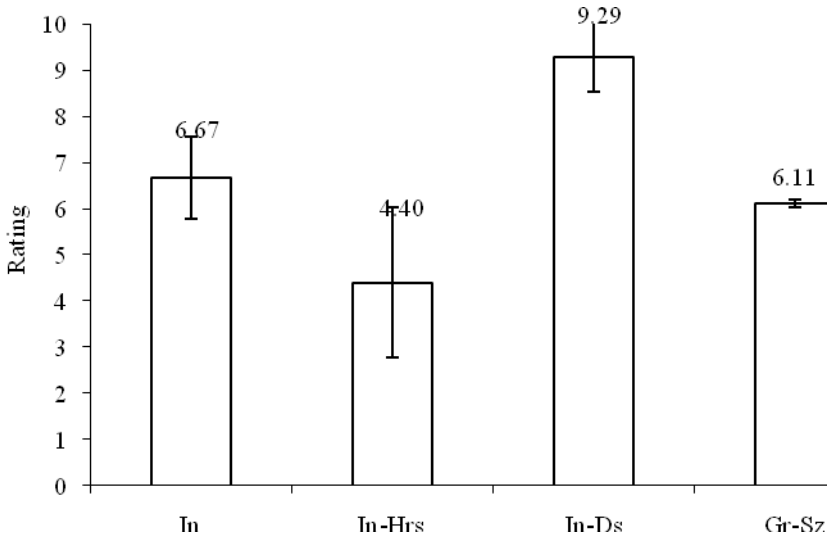
Figure 8: Ratings for walk and time of walk for captive elephants of temples in Karnataka

The elephants, belonging to Hombuja Jain Mutt and Suttur Mutt, Mysore were given a rating of 10 for this parameter.

Social interaction

- Sixty six percent of the elephants were given opportunity for interaction with other animals. The remaining animals were allowed no interaction.
- Mean duration of interaction was 10.6 h (SE = 3.8, N = 10) ranging from 0 to 24 h, with 50% of the elephants interacting for less than three hours and 40% for 24 h (N = 10).
- Mean number of individuals for interaction was 2.0 (SE = 0.6, N = 16) ranging from 1 to 10 animals with 94% of the elephants interacting with three or lesser number of individuals. Eighty three percent of the elephants had only females for interaction while 6% interacted only with males (N = 18). Only two elephants had both males and females as part of a group. Ten temples had elephants with female: female combination while six had male: female combination.

The maintenance of single elephants precluding any kind of social interaction with other elephants is a feature of many captive elephants systems. The opportunity for social interaction was rated across four sub-parameters. Overall mean (Figure 9) for interaction was 6.63 (SE = 1.2, N = 4) indicating moderate conditions for interaction and related features.



In: Interaction with other elephants In-hrs: Hours of interaction
In-Ds: Distance of interaction Gr-Sz: Group size of the elephants

Figure 9: Ratings for interaction-related parameters for captive elephants of temples of Karnataka

- A female elephant belonging to a temple in Bichali got an overall rating of 5.67 as the interaction distance was > 2 m and the group size consisted of only females two adults and one sub-adult without any opportunity for free ranging.
- A female elephant belonging to Hombuja Jain Mutt got an overall rating of 9.25 as the elephant was allowed interaction for 24 h within reachable distance.

Distribution of ratings for interaction shows interesting observations: about 24% elephants have no interaction among them and 51% of elephants are exposed to satisfactory rating (Figure 10).

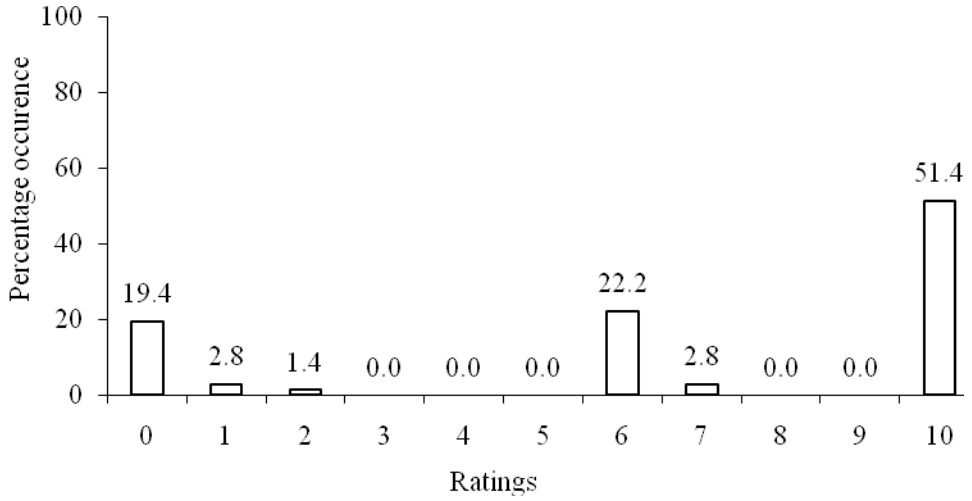


Figure 10: Distribution of ratings for interaction among the elephants of temples in Karnataka

The ratings for providing opportunity for the captive elephant to interact occurred in two categories only: 10 occurrence of interaction, 0 absence of interaction. Mean rating was 6.7 (SE = 0.89, N = 30) with 67% of the elephants reported to be allowed to interact with other elephants. High ratings indicate group size replicating that found in the wild. Mean rating was 6.2 (SE = 0.09, N = 18) implying the presence of male–female or all-female groups, with restricted movement due to lack of free-ranging opportunity.

Training

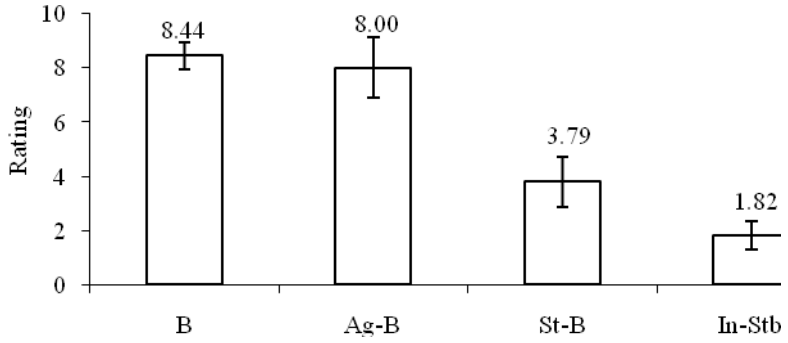
Ninety one percent of the animals are trained. Training type involves temple activities, logging, garlanding, trumpeting, going backwards, lifting legs, etc. Mean number of commands used is 17.6 (SE =3.0, N = 24) ranging from 3 to 75.

Observed Behaviour

- The temperament of the animals was classified into different categories. Sixty-nine percent were calm/docile, 13% were predictable and 19% nervous/calm and nervous. Thirty nine percent of the elephants were rough with three reported incidents of injuries or killing of people. All the reported incidents involved injury/death of the mahout. In one incident, a male elephant of Shirur Temple had killed its mahout as the handler had beaten the animal in a drunken state.
- Sixty two percent of the observed animals exhibited stereotypy (N = 29) such as swinging head, body movement to and fro, shaking its head, moving its head and trunk, etc.

The assessment of the behaviour of a captive animal assumes importance in the context of deviation from a natural environment. The temperament of the animal, occurrence of aggressive behaviour and expression of stereotypy are all indicators of the health of the system managing the elephants. Behaviour of the animal was averaged across four sub-

parameters (Figure 11). The overall mean rating was 5.51 (SE =1.87, N = 4) indicating occurrence of unsuitable environment resulting in expression of unwanted behaviour.



B: Observed behaviour Ag-B: Aggressive behaviour towards people
St-B: Stereotypic behaviour In-Stb: Intensity of stereotypic behaviour

Figure 11: Ratings for behaviour-related parameters for captive elephants of temples of Karnataka

- A female elephant, belonging to Sri Saundatti Yellamma Temple, got an overall mean rating of 1.88 for expression of nervous behaviour, aggression towards people and for the presence of stereotypic behaviour.
- Four elephants got an overall rating of 10 as these elephants were described as calm, with no aggressive behaviour towards people and no observed stereotypy.

Distribution of ratings for behaviour-related parameters is presented in Figure 12, showing 37% occurrence of ratings less than four.

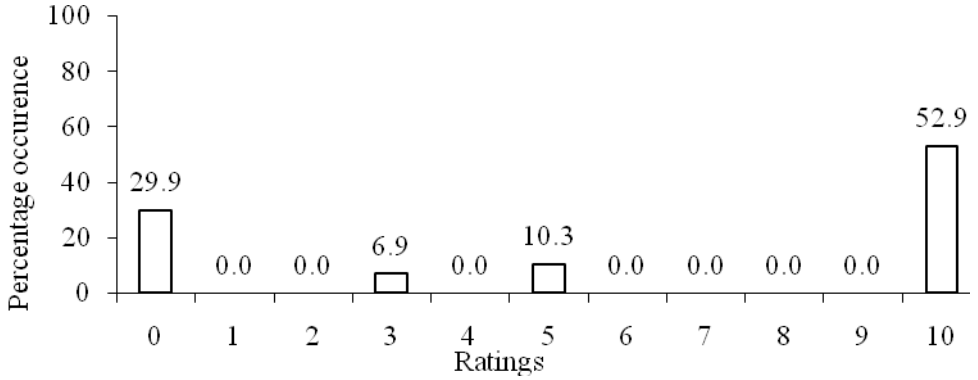


Figure 12: Distribution of ratings for behaviour-related parameters of captive elephants of temples in Karnataka

Observed behaviour, reflects the ease of managing the elephant. Mean rating of 8.4 (SE = 0.48, N = 32) for this sub-parameter implies manageable behaviour. However, it should be noted that this behaviour may have resulted from being conditioned to be so. Only one elephant, belonging to Krishna Temple, Udupi, got a rating of 0.0 indicating aggressive/unpredictable behaviour. Twenty five percent of the animals were nervous.

High rating for incidents of injury/ killing implies no occurrence of such incidents. Mean rating for this sub-parameter was 8.0 (SE = 1.11, N = 15) with 80% getting a rating of 10. Low rating indicates the occurrence of stereotypy in the observed animals. Mean rating was 3.8 (SE = 0.93, N = 29) with 62% reported to express stereotypy.

Work type

- The animals performed work related to the temple such as standing in front of the temple, blessing devotees, garlanding, participating in processions, bringing water from the river, etc. for a mean duration of 2.8 h (SE = 0.59, N = 23).
- Work duration ranged from 0.5 to 7.5 h. Thirty nine animals worked for 1 h/day while 48% worked between 2 and 5 h.
- The mean age of elephants when they had begun work was 10.8 yrs (SE = 3.28, N = 12) ranging from 2 to 35 yrs. Fifty percent began working when they were 5 yrs or less.
- Seventy nine per cent sought donations (fruits, vegetables, money, sweets) from the public.
- The mean maximum weight carried was 116 kg (SE = 38.5, N = 10).

Low rating for work-related parameters indicates the nature of work to be unnatural to the elephant. Mean rating was 0.9 (SE = 0.18, N = 28); all the ratings were less than 6.0 implying such activities as performing pooja, standing in front of the temple, being part of a procession, blessing devotees, etc. Only 60% of elephants got shade during work (Figure 13), 80% got water and about 75% were allowed rest during work.

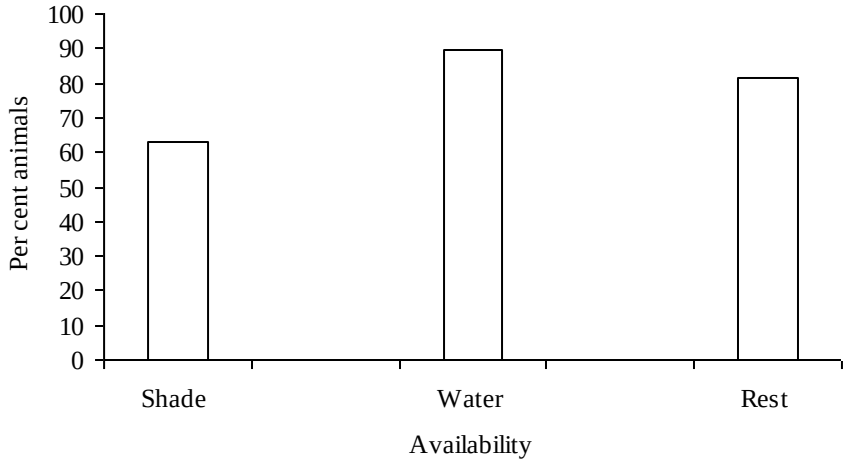


Figure 13: Percentage of elephants exposed to shade, water and rest in temples of Karnataka

Distribution of ratings (Figure 14) suggests that most of the values of captive elephants kept in temples fall in the range 0 and 1, and have not managed to score 6 to 10 ratings at all.

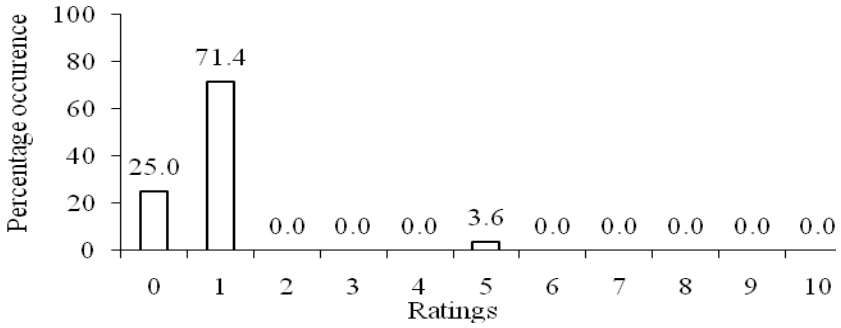
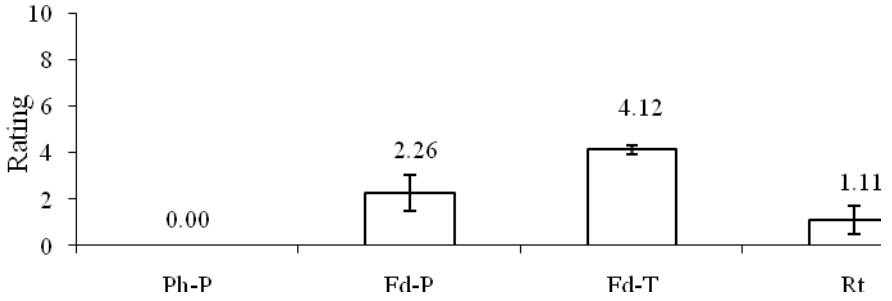


Figure 14: Distribution of ratings for work-related parameters of captive elephants in temples of Karnataka.

Provision of food

- Of the 30 elephants, 80% were stall-fed while only 7% were allowed to range free. The food included: rice (*Oryza* sp), ragi (*Eleusine* sp.), jaggery, horse gram (*Dolichos* sp.), bamboo leaves (*Bambusa* sp.), grams, forest produce such as a variety of greens, palm leaves (family Arecaceae), maize (*Zea mays*), straw, coconut (*Cocos nucifera*), boiled rice. Sweets like *payasam, prasadam, kadubu* were also given.
- A female of Mahalakshmi Temple was given some of the above and "hotel items"
- A female of Shri Siddalingeshwara Temple, Yediyuru, Kunigal Tq, Tumkur Dist food includes biscuits from devotees
- A female elephant belonging to Sri Mahalingeshwar Temple, female, was given some of the above items and and also idli (steamed food made of rice) vada and dosa (fried food made from pulses and rice**)**

Method of providing food, i.e., either by stall-feeding or allowing to graze or both, the number of food items provided, alteration in diet, ration chart usage were rated. The overall mean for food-related parameter (Figure 15 and 16) was 1.38 (SE = 0.61, N = 4) with rating for each elephant ranging from 0.0 to 5.13.



Ph-P: Provision of food during physiological periods Fd-P: Type of food provisioning
Fd-T: No. of food items Rt: Usage of ration chart

Figure 15: Ratings for food related parameters for captive elephants of temples in Karnataka

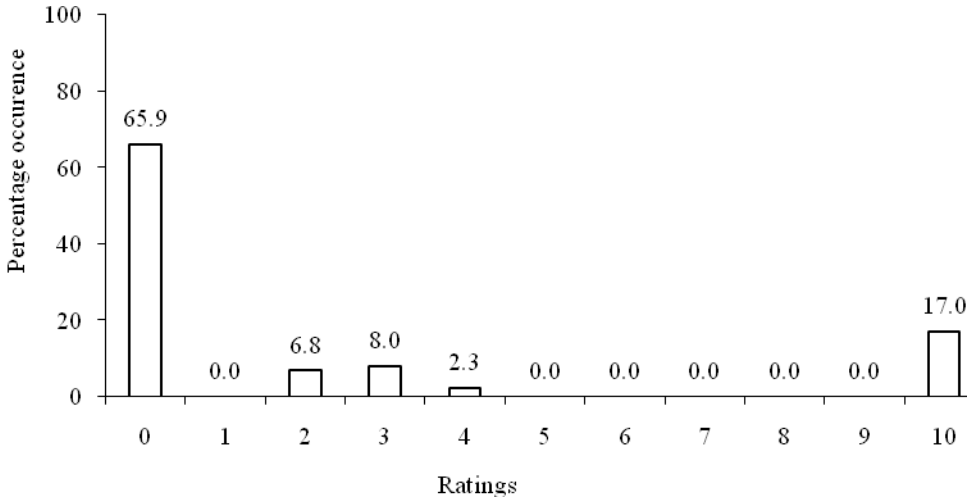


Figure 16: Distribution of ratings for food related parameters of captive elephants in temples of Karnataka

High rating for method of providing food indicates the use of stall-feeding and allowing the elephant to graze. Mean rating for food provisioning type was 2.3 (SE = 0.7, N = 31) with 77% of the elephants getting a rating of 0.0. This shows most of the elephants were not allowed to graze for themselves. However, elephants belonging to Sri Kollur Mookambika Temple, Sri Rambhapuri Mutt Sri Kshetra, Dharmasthala, Sri Siddalingeshwara Temple, Yediyuru, Kateel Sri Durga Parameshwari Temple and Hombuja Jain Mutt are said to be allowed to graze and given stall-feed.

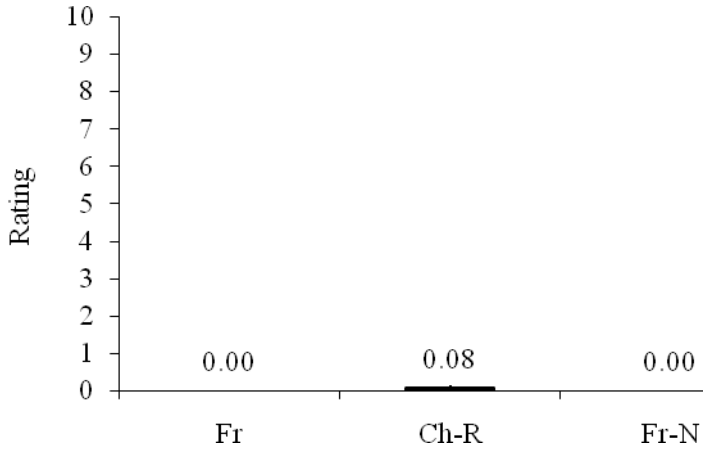
Usage of ration charts helps in maintaining the diet of the animal and also in the inventory of supplies. Mean rating was 1.11 (SE = 0.62, N = 27) with 89% of the temples not using a ration chart. The institutions which used ration chart were Sri Kshetra, Dharmasthala and Nanjundeshwara Temple, Nanjangud, Mysore.

Free-ranging status

- All the elephants observed (N = 27) were chained. However, it may also refer to the fact of a chain tied around the animal rather than being tied to one place.
- Mean chain weight (tied to the leg) was 23.2 kg (SE = 4.6, N = 25) ranging from 2.5 to 110 kg.
- Mean chain length (leg) was 371.6 cm (SE = 46.65, N = 20) ranging from 135 to 840 cm. All the elephants were tied with a chain of length less than 100 cm or 1 m.
- Mean chain size (leg) was 1.8 cm (SE = 0.58, N = 20).
- None of the animals was allowed to range free at night (N = 24).

Chaining and imposition of restriction on the animal's movement are widespread practices. Hence, these aspects were rated using three sub-parameters (Figure 17). High rating indicates lesser dependence or absence of chains on the animal and greater

freedom of movement. Overall mean rating was 0.02 (SE = 0.02, N = 4) showing bad conditions for this feature.



Fr: Free-ranging status Ch-R: Chaining region Fr-N: Free-ranging at night

Figure 17: Ratings for free-range status of captive elephants in temples in Karnataka

Distribution of ratings for free-ranging status of temple elephants is presented in Figure 18, and all values were less than two.

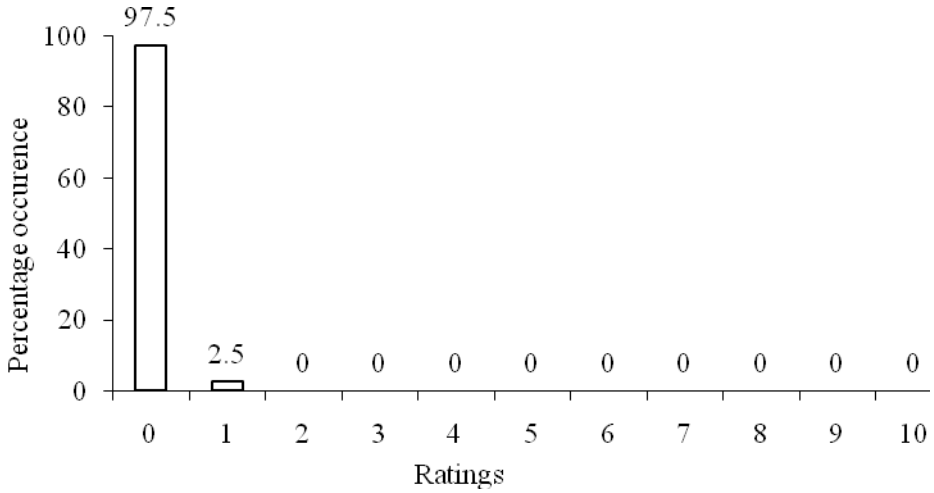


Figure 18: Distribution of ratings for free-ranging status of captive elephants in temples of Karnataka

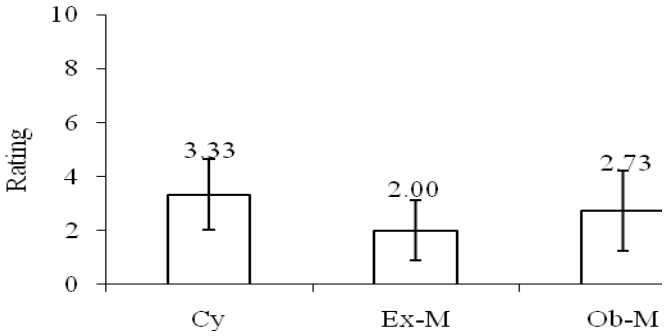
- The restrictions imposed by chaining an animal leads to several health problems and welfare issues. Low rating for chaining status indicates lesser opportunity to move freely. Mean rating was 0.0 (SE = 0, N = 32) showing no free-ranging opportunity.

- Chaining an animal in more than one region of its body is practiced as a way of controlling the animal. Mean rating of 0.1 (SE = 06, N = 24) indicates the use of chain in more than one region.
- When captive elephants have no work at night, they are let out to range freely. Mean rating for free ranging at night was 0.0 (SE = 0, N = 24) showing that none of the sampled animals from the temples was allowed to range free at night.

Reproductive status

- Seventy one percent of the elephants (N = 14) were not cycling and exposure to males was only 19% (N = 16).
- Only two elephants had given birth to a calf each. Age at first birth was 15 yrs for one female and 25 to 26 yrs for another female.
- Two of the male elephants were in active reproductive state. Of the three male elephants for which data was collected, two are in musth. Two male elephants were chained for the duration of musth ranging from 36 months.

Reproductive status of a captive animal is considered to be an important parameter in terms of its welfare. It was rated across three sub-parameters (Figure 19). Overall mean rating for female reproductive status was 2.7 (SE = 0.47, N = 3) implying poor reproductive status and one elephant belonging to Nanjanagudu Temple got a rating of 10.0.



Cy: Cycling status of female Ex-M: Exposure to male
Ob-M: Observation of mating

Figure 19: Ratings for reproductive status of captive elephants of temples in Karnataka.

Distribution of ratings show (Figure 20) that 73% occurrence of zero and only 27% occurrence of 10 values.

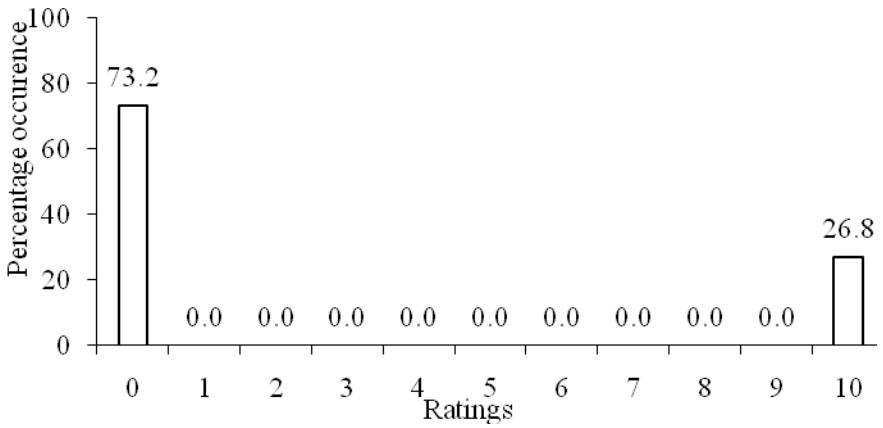


Figure 20: Distribution of ratings for reproductive status of captive elephants in temples of Karnataka

Low rating indicates fewer females in breeding condition. Mean rating was 3.33 (SE = 1.3, N = 15) with 67% of the sampled elephants not cycling (age ranged from 9 to 51 yrs). The animals reported to be cycling belonged to Sringeri Temple, Nanjundeshwara Temple, and Hombuja Jain Mutt, Karnataka. Providing an opportunity for the elephant to breed by exposure to males is an indication of attempt at maintenance of natural behaviour of the animal. Low rating for this parameter indicates the absence of male for mating. Mean rating was 2.0 (SE = 1.11, N = 15) implying lack of exposure to males. Eighty percent of the sampled animals were not exposed to males.

Captive elephants exhibit a range of behaviours when exposed to male elephants due to past interactions or simply absence of any interaction. When exposed to a male elephant, the incidence of mating was also rated. Mean rating was 2.7 (SE = 1.48, N = 11) with 73% of the places reporting no observation of mating incidents. The number of males among the temples studied was only five as opposed to 27 females. The data for reproductive status was scanty with sample size not exceeding three. The data is presented below:

- Two males, belonging to Samson Distilleries, Davanagere were reproductively active.
- The elephants, belonging to Shirur temple, and Samson Distilleries, Davanagere were said to be experiencing musth at the time of survey. Rating for both reproductive activity of males and musth occurrence was 6.7 (SE= 4.1, N= 3).

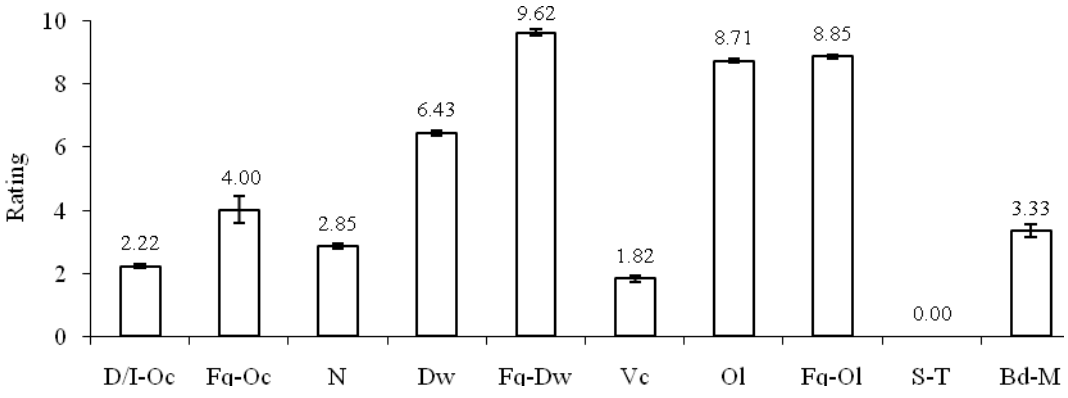
Health status and veterinary care

- Disease/injury occurrence was 81% (N = 26) with 14 having foot-related problems.
- De-worming was administered for 62% of the animals (N = 29) with mean frequency being 3.9 (SE = 1.21, N = 12). The drug used varied from allopathic to ayurvedic or locally prepared medicines.
- Vaccination was given to 24% of the animals with no records being available for 14% (N = 29).

- Oiling was done for 87% of the animals (N = 31) using castor, neem or coconut oil for the head or leg.
- No tests were done of dung/urine/blood samples for the six animals for which data is available.
- Veterinary doctors were available for 17 elephants. A veterinary doctor prescribed medicines for one female elephant without examining the animal.
- Of the 15 temples for which data is available, six doctors had previous experience in treating elephants with 57% of the doctors being on call.
- The distance to the temple from the doctor's place varied from 0.5 to 62.5 km for "on call" visits and 11 to 30 km for "monthly" visits.

The health of a captive elephant is considered to be among one of the indicators of its welfare. However, it should be noted that good health conditions do not guarantee good welfare status. Health status of elephants was rated using 10 sub-parameters (Figure 21). Low rating implies poor conditions of health maintenance. The overall mean rating was 4.8 (SE = 1.13, N = 10) indicating poor health status. The same for individual elephants ranged from 0.17 (SE = 0.18, N = 6) to 9.0 (SE = 1.12, N = 5).

For individual mean rating for health status, only those animals for which at least five sub-parameters were rated have been considered. This is to ensure that at least a few direct health-related factors such as disease/injury occurrence/vaccination done/deworming done/ blood tests done, etc. have been rated. Otherwise, less significant parameters such as oiling and oiling frequency, vaccination frequency may influence the rating pattern leading to high scores.



D/I-Oc: Disease/Injury occurrence Fq-Oc: Frequency of occurrence of disease/injury
N: Nature of disease/injury Dw: De-worming done Fr-Dw: Frequency of de-worming
Vc: Vaccination done Ol: Oiling done Fq-Ol: Frequency of oiling
S-T: Blood/urine/dung sample tests done Bd-M: Body measurements taken

Figure 21: Ratings for health-related parameters for Captive elephants in temples of Karnataka

- One female, belonging to Sri Saundatti Yellamma Temple got an overall rating of 0.17 implying very poor maintenance of health.

- One female belonging to Nanjanagudu Temple got an overall rating of 9.0 implying near-ideal maintenance of health condition.

Distribution of ratings for health status of elephants in temples suggests 46% occurrence of values less than four (Figure 22).

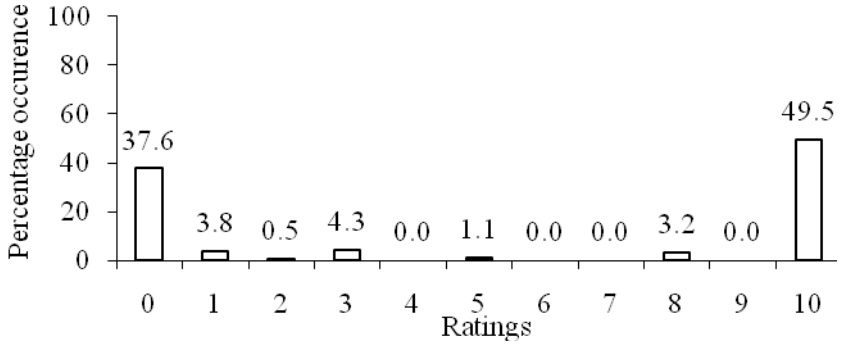


Figure 22: Distribution of ratings for health status of elephants in temples of Karnataka

Low rating for disease/ injury occurrence indicates occurrence of the same in the observed animals. Mean rating for disease/ injury occurrence was 2.22 (SE = 0.83, N = 27) with 78% of the animals reported to have experienced some disease/injury.

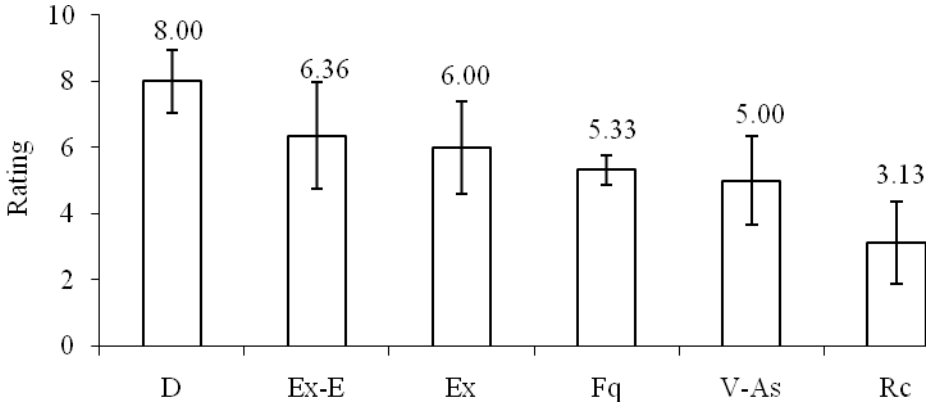
- Elephants which were free from disease/injury belonged to Sri Kollur Mookambika Temple, Sri Rambhapuri Mutt, Sri Krishna Temple, Udupi, Nanjanagudu Temple, Sri Kshetra, Dharmasthala and Sri Maralu Siddeshwara Temple.

Mean rating for nature of disease and injury was 2.85 (SE = 0.56, N = 20) implying occurrence of less-harmful/painful disease/injury but leading to health problems or being non-curable. Eighty-five percent of the sampled animals scored less than 3 for this parameter.

- One female elephant of Nanjanagudu Temple gets a rating of 0 as she is suffering from nail rot for the past three years with frequency of incidence being every month.
- One female elephant of Mukti Mandir Dharma Kshetra, Gadag and one female of Hombuja Jain Mutt got a rating of 8 as the injury is an old leg wound from chains and a muscle catch in the leg, respectively.

High rating implies adherence to the practice of de-worming the elephants. Mean rating for deworming of elephants was 6.43 (SE = 0.94, N = 28) with 64% of the elephants de-wormed at least once. Vaccination of captive elephants is an important practice as the animal is exposed to diseases from close contact with domestic animals. Mean rating was 1.82 (SE = 0.86, N = 22) implying poor adherence to the practice of vaccinating the animals with 82% of the sampled animals not being vaccinated. The health of an animal can be gauged by taking its morphometric measurements periodically. This practice was also rated. Mean rating was 3.33 (SE = 1.48, N = 12) implies poor adherence to the practice of taking body measurements. Availability of a veterinary care such as a

doctor/assistant, doctor's experience with elephants, is a major factor in maintaining the health of an elephant. This parameter was rated across six sub-parameters (Figure 23). Overall mean rating was 5.64 (SE = 1.1, N = 6) with individual mean rating of each elephant varying from 0.0 to 10.0.



D: Veterinary doctor availability Ex-E: Experience with elephants
Ex: Doctor's experience with animals Fq: Frequency of visits
V-As: Veterinary assistant availability Rc: Record maintenance

Figure 23: Ratings for veterinary care facilities for captive elephants of temples in Karnataka

Distribution of ratings for veterinary facilities suggests occurrence of 37% values with rating less than five (Figure 24).

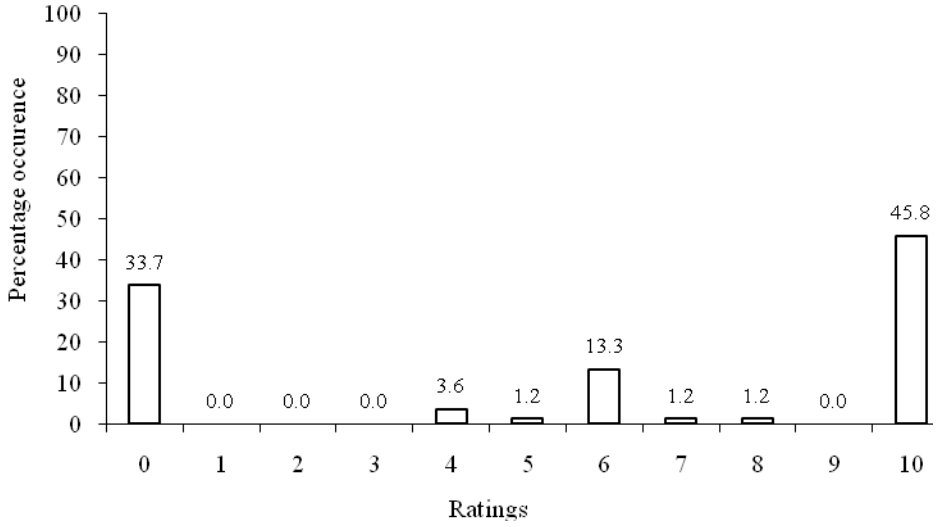


Figure 24: Distribution of ratings for veterinary facilities for captive elephants in temples of Karnataka

Mean rating for availability of veterinary doctor was 8.0 (SE = 0.94, N =20) implying a satisfactory status regarding the availability of veterinary doctor with 80% of the temples reporting availability. Experience in treating elephants has also been rated. A rating of 10

indicates experience in treating elephants. Mean rating of 6.4 (SE = 1.6, N = 11) implies availability of doctors with lesser experience in treating elephants. Sixty four percent of the temples reported veterinary doctors treating their elephant had experience with the animal.

Irrespective of the health of an animal, frequent visits by a doctor will help in maintaining an elephant's health and will assist in observing any abnormality in its health status. Mean rating for frequency of veterinary doctor's visit was 5.33 (SE = 0.45, N = 15) with all the places getting a rating less than 8 for this parameter.

- Fifty seven per cent of the temples reported that the doctors were on call with 14% reporting that the frequency was daily/ weekly.
- One elephant belonging to Kateel Sri Durga Parameshwari Temple, Mangalore, was given a rating of 0 indicating that the doctor had never visited the temple to check the elephant.

Status of infrastructure

- Staff quarters, including rented houses, were available for 95% of the temples. Elephant chains have a mean frequency of replacement of 0.5 /year (SE = 0.2, N = 16) ranging from 0 to 2 times per year.
- Mean number of managers per temple was 1.6 (SE = 0.42, N = 12) ranging from 1 to 5. Responsibility of the manager included maintenance of shelter, distribution of ration, and managing personnel.
- The mean number of mahouts available per temple is 1.1 (SE = 0.06, N = 22) ranging from 1 to 2.
- There was no maintenance of records (service/clinical/medical) in 71% of the temples.
- Overall fund required per animal per year ranged from Rs.1,90,000/- to 3, 00,000/-.
- Annual veterinary cost ranged from Rs. 10,000/- to 30,000/-. However, the above costs are based on data from 23 temples only. Mean annual cost for salaries is Rs. 54,371 (SE = 29, N = 7) ranging from Rs. 28,000/- to Rs. 1, 00,000/.
- Lack of funds might induce elephant owners to move their animals frequently as may be the case for a female elephant of Mahalakshmi temple, Chippalkatti, Ramdurga taluk), an elephant shifted across towns every 34 months, according to her mahout.

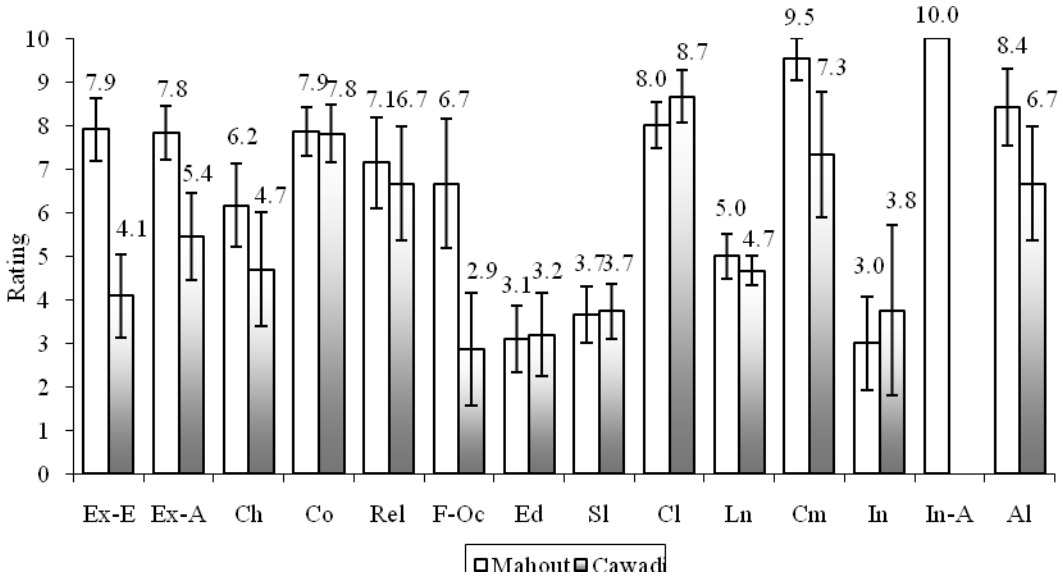
Mahout/cawadi status

- The mean age for mahout in the temples observed was 35.4 yrs (SE=2.9, N = 21) ranging from 21 to 60 yrs, and for cawadi was 30.4 yrs (SE= 2.5, N = 16) ranging from 18 to 48 years.
- Mean experience as mahout was 20. 8 yrs (SE= 2.8, N = 21) ranging from 0.5 to 45 yrs, while for cawadi it was 11.7 yrs (SE= 2.1, N = 15) ranging from 3 to 27yrs. Mahout experience with a particular animal is 10.8 yrs (SE= 1.9, N = 21) ranging from 0.5 to 35 yrs. Cawadi experience is 4.1 yrs (SE= 0.8, N = 16) ranging from 0.5 to 10 yrs.

- Only 33% percent of the mahouts (38% of cawadis) had joined the profession out of interest. Thirty nine percent (19% of cawadis) joined as it was an ancestral profession.
- Seventy two percent of mahouts (44% of cawadis) had received training in this profession.
- Only 13.6% of mahouts (13.3% of cawadis) were paid a salary in the range of Rs. 4000 to 5000/- p.m. Most (54%) were paid a salary of less than Rs. 2000/- p.m., while 60% of the cawadis were paid less than Rs. 2500/- p.m.
- The mean number of children per mahout was 3 (SE = 0.5, N = 17) ranging from 0 to 8, and for cawadi is 2.7 (SE = 0.5, N = 9) ranging from 1 to 5. The mahout/cawadi of elephant Indira (37.5 yrs, female) had reportedly appointed another person to take care of the animal at night.
- Many of the mahouts and cawadis did not have insurance of 20 mahouts, 70% did not have insurance cover, while 77% (N = 13) of cawadis were uninsured.
- Eighty-four percent (N = 19) of mahouts (67% of cawadis, N = 15) abstained from alcohol.
- Eighty one percent of the mahouts (92% of cawadis, N = 13) of a total of 21 interviewed did not have any regular medical check-ups/vaccination.
- All the mahouts (N = 21) used tools to control the elephant with 75% using both Ankush and stick. Each elephant had a mean of 2 mahouts (SE = 0.4, N = 15) ranging from 0 to 5 in number.

The welfare status of the mahout/cawadi was rated using a number of socio-economic parameters and experience with elephants. Poor socio-economic conditions of an animal handler might result in poor handling of the animal resulting in reduced welfare status of the elephant. The ratings are on the same scale of 0 to 10, with 0 indicating worse conditions and 10 implying the best possible situation.

The overall mean rating value for mahouts, assessed across 15 parameters (Figure 25), was 6.88 (SE = 0.6, N = 15) while it was 5.33 (SE = 0.5, N = 14) for cawadis. Their overall mean rating shows their welfare status (including their professional experience) to be moderate.



Ex-E: Experience with particular elephant Ex-A: Experience as % of his age
Ch: Reason for choosing profession Co: Community of mahout/cawadi
Rel: Relatives working as mahout/cawadi F-Oc: Family occupation
Ed: Education level SL: Salary Ln: Languages known
In: InsuredIn-A: Amount of insurance Al: Alcohol consumption

Figure 25: Ratings for mahouts in temples of Karnataka

The values for distribution of ratings for mahout welfare status shows occurrence of 55% ratings whose values are more than 7.0; the same for cawadi was 40% (Figure 26).

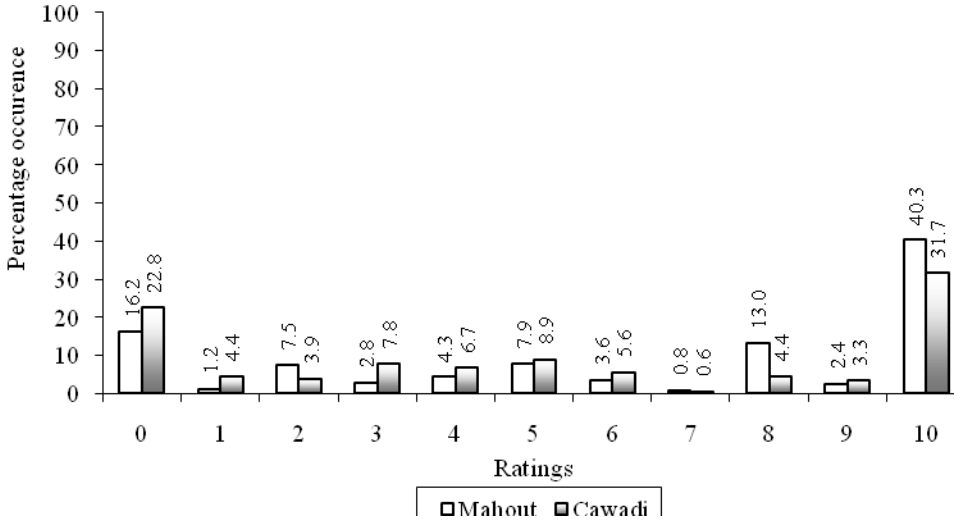


Figure 26: Distribution of ratings for mahout and cawadi welfare status in temples of Karnataka

The feature of experience of mahout/cawadi is meant to indicate the period spent with the particular animal. High rating shows longer duration with the animal. Longer duration with one particular animal is considered good as the animal and its handler learn about each other's ways. However, one disadvantage is ill-treatment by a handler which may result in conflict between the animal and the handler. Mean rating for mahout experience was 7.9 (SE = 0.7, N = 21) with 52% of mahouts getting a rating of 10 indicating duration with the animal which is > 50% of the elephant's age. Mean rating for cawadi was 4.1 (SE = 0.9, N = 16) with 19% of cawadis getting a rating of 10.

The mahout/cawadi's experience in the profession as percentage of his own age was rated. Mean rating for mahout was 7.8 (SE= 0.6, N = 21) implying professional experience of satisfactory nature. Forty eight percent of the mahouts were given a rating of 10 indicating experience of > 50 % (of his age) in the profession. Mean rating for cawadi was 5.4 (SE= 0.9, N = 15) showing moderate professional experience. Thirty three percent of the cawadis get a rating of 10.

High rating for the reason for choosing this profession implies choosing this profession on own volition and having been mahouts traditionally. Mean rating for mahout was 6.2 (SE= 0.9, N = 18) with 39% of the mahouts opting due to tradition only. Twenty eight percent were given a rating of 0 as they chose this as a way of employment; only one mahout chose out of interest and as a traditional means of employment. The mean rating for cawadi was 4.7 (SE= 1.3, N = 13) with 46% choosing only as a means of employment. However, 39% chose this purely out of interest.

High rating for income from this profession indicates a salary sufficient to support a family of four. Mean rating for mahout was 3.7 (SE = 0.7, N = 20) with 75% getting a salary < Rs.30,000/- per year. Only two of the mahouts interviewed got a salary of Rs. 60,000/- per year. The mean rating for cawadi was 3.7 (SE = 0.6, N = 15) with 67% getting a salary < Rs.30,000/- per year. Only two cawadis got a salary of Rs.50,000/- per year.

Alcohol consumption adversely affects the handlers' state of health and ability to interact with the animal. It may lead to ill-treatment of the elephant. Mean rating for mahout was 8.42 (SE = 0.9, N = 19) implying reduced occurrence of consumption of alcohol among the handlers. Eighty four percent of the mahouts did not consume alcohol. The mean rating for cawadis was 6.7 (SE = 1.3, N = 15) indicating moderate conditions for this feature. Sixty seven per cent of the cawadis were not consuming alcohol.

Overall welfare status of captive elephants in temples

The mean rating considering all the individual rating values across all the parameters studied was 4.18 (SE = 0.12, N = 1152). This implies poor state of welfare. Only 32% of the ratings ranged from 7.5 to 10.0 (Figure 27).

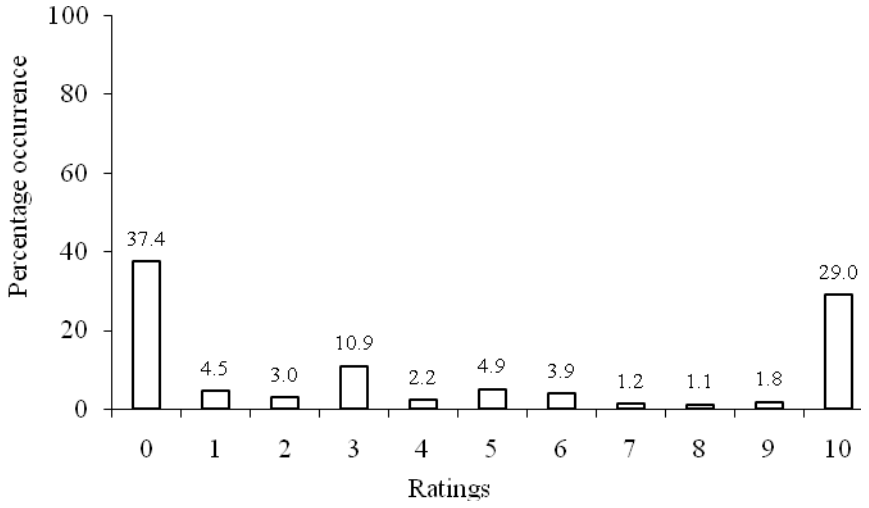


Figure 27: Distribution of overall rating for elephants in temples of Karnataka

Discussion

The ratings for assessing the welfare status of the elephants reflect deviations from the conditions experienced by the animal in the wild. Elephants, in the temples observed, for shelter status are given an overall rating of 3 implying adverse living conditions, and housing in restricted space with unsuitable substrates. Female Asian elephants in the wild range over an area of 34,800 sq m, while males range from 200 to 235 sq m (*Sukumar, 2003). Hard substrates lead to foot problems for the confined animals (Clubb and Mason, 2005, *Rajankutty, 2004). Keeping this in mind, the maintenance of elephants in small and unnatural conditions in temples makes it a significant factor contributing to reduced welfare.

The overall rating of 6.45 for water-related parameters suggests occurrence of tolerable conditions. However, when a parameter of basic importance such as the availability of running water is considered, 70% of the elephants were provided water from taps or non-flowing sources such as lakes or ponds. Tap water is not accessible to the elephant when it needs to drink and lakes/ponds are stagnant water-bodies. Related parameters such as bathing duration or quantity of water the animals drink per day depend on this unsuitable source of water.

The rating of 3.90 for sleep and related parameters implies poor conditions. This is mainly due to two factors: a) the sleeping place, and (b) the size of the place. The low rating for sleeping place and size is because of the concurrent use of the shelter as a sleeping place also.

Benz (2005) states that "…blood supply within the foot is of prime importance. Therefore, exercise and motion in captivity is not just essential for abrasion of the horn, but also for a better blood supply and therefore a better horn growth rate and horn quality". The elephants are allowed or made to walk for distances ranging from 1 to 30

km a day. However, the rating of 5.5 indicates moderate conditions with a need for improvement for walking conditions in terms of allowing the animal to range free and on suitable natural surfaces. The timing of the walk also needs to be changed to early morning or late evening hours.

The rating for social interaction among the elephants implies need for improvement. Thirteen elephants were not allowed any interaction at all and the mean number of animals was only two whereas a minimum of six individuals is considered a minimal group size replicating conditions in the wild. The need for a "family" environment is considered necessary for the growth and development of a young animal (*Sukumar, 1994). Kurt and *Garai (2001) suggest a link between young elephants lacking social interaction and expression of stereotypy by the animal.

The presence of unrelated animals in groups in temples may lead to aggressive interaction. This may be stressful for the animals considering the confined space within which they are housed. In the temples observed, the animals were housed within 40 ft of each other.

The rating for the temperament of the elephants in temples suggests a pliable behaviour of the captive animal. However, two factors need to be considered: a. occurrence of stereotypy, and b. aggression towards people.

a. Stereotypy: The occurrence of stereotypy in over half the number of elephants observed shows the need for urgent action in this aspect. Several factors have been studied and may cause the development of stereotypies in captive animals: restricted movement, improper housing conditions, social factors (Clubb and Mason, 2005). In this context, ratings for shelter and chaining of the animal, among the temples observed, are less than 3 implying poor conditions.

b. Aggression: Nearly 40% (N = 18) of the observed animals are rough and aggressive towards people. In some cases, it involved the death of the victim also. Of the five males observed in the temples, four were said to be rough/aggressive. Another male, was considered to be nervous. Data is available for one male regarding its behaviour during musth. This elephant was aggressive too. Also, during musth, the elephants were said to be chained and isolated.

All the observed elephants were given a rating of less than 3 for work type highlighting the unnatural and unsuitable work conditions for the animal. The mean work duration is only 2.8 h, but it involves such arduous tasks as standing on stone or concrete floor in front of temples, being exposed to the sun, blessing people (repetitive action causing strain to the trunk), begging for money or food, etc. None of these activities is part of an elephant's natural way of life and involves a lot of training and forsaking of natural behaviours. Added to this, none of the elephants is allowed to range free, even at night, being chained for an average of 14.9 h a day. Work conditions need to be altered to provide for the expression of natural behaviour.

The practice of stall-feeding does not ensure the availability of the range of foods that an animal selects for itself while ranging free. Most of the temple elephants were given only stall food. Food also included, for some elephants, unsuitable items like idli and vada from hotels. Ration charts are not used. Right kind of food along with free-range browsing for the animal is important.

All the temple elephants observed were subjected to chaining with a majority being chained in more than one region. The mean rating of 0.02 implies need for some corrective action. Studies show that chained animals may not get to spend time with their preferred partners (*Schmid, 1995), and there is higher incidence of stereotypy among such animals (*Gruber *et al.,* 2000, Schmid, 1995). Those that are chained overnight may have foot problems due to accumulation of dung and urine at the chaining place and arthritis due to restricted movement (*Galloway, 1991). Foot problems occurred in 14 of the elephants observed.

The mean rating for reproductive status of female elephants is less than 3 implying poor conditions in terms of number of females cycling or allowed to breed. The high incidence of acycling females, despite prevalence of adult female elephants, is by itself an indicator of poor welfare status. Adverse conditions such as transportation/harsh handling affect cycling in domestic animals (*Dobson and Smith, 1995, *Bearden and Fuquay, 2000). Poor conditions of captivity in "intensive systems" like temples may predispose the animal to acyclic nature (Kurt, 2005).

Disease or injury in 81% of the animals is compounded by the fact that the veterinary doctors are available for treatment "on call" for 57% of the animals. When this is viewed in terms of the distance to the doctor's place (ranging from 0.5 to 62.5 km), treatment becomes an issue of importance. Physiological tests on blood/urine/dung were not done, maintenance of records was poor and body measurements were not taken regularly, if at all.

The socio-economic status as well as experience in the profession was assessed for the keepers of the elephants. The ratings for both mahouts and cawadis seem to indicate occurrence of poor conditions. Among the parameters rated, 50% of variables (for mahouts), 86% (for cawadis) score less than 8.0 implying need for improvement. Of this, 29% (mahouts and, 60% (cawadis) score less than 6, which shows the existence of moderate to poor conditions.

Some parameters that were given rating values less than 6:

- Both mahout and cawadi salary was given a rating less than 5 implying inadequate income for the keepers. The mean annual wage for the mahout is Rs. 23,260/- (ranging from Rs. 6000 to 72,000/-) with 64% earning in the range Rs. 10,000–30,000. When viewed in terms of number of children that the mahout had, which, on average, is three (ranging from 0 to 8), the salary seems to be insufficient to support a family.

The wage profile for cawadis is no different: mean annual salary was Rs 23,013/- (ranging from Rs.9600 to 48,000/-) with 60% earning in the range Rs. 10,000-30,000. Cawadi families had a mean number of three children (ranging from 1 to 5).

- The score of 3 for insurance cover provided to the keeper highlights the poor conditions prevalent as far as financial security in the event of accident/ death of the keeper. Seventy percent of the employees were not covered by insurance. Coupled with this, 81% of mahouts and 92% of cawadis did not undergo any health check-ups. The check-ups are significant in the light of transmission of diseases such as tuberculosis across keeper and his animal (Anon., 2003, Cheeran 1997).

References

1. *Bearden, H.J. and Fuquay, J.W. 2000. Applied Animal Reproduction New Jersey, Prentice Hall.
2. *Dobson, H. and Smith, R.F. 1995. Stress and reproduction in farm animals. Journal of Reproduction and Fertility Supplement **49**: 451 – 461.
3. *Gruber, T.M., Friend, T.H., Gardener, J.M., Packard, J.M., Beaver, B. and Bushong, D. 2000. Variation in stereotypic behaviour related to restraint in circus elephants. Zoo Biology **19**: 209 – 221.
4. *Kurt, F. and Garai, M. 2001. Stereotypies in captive Asian elephants- a symptom of social isolation. Abstracts of the International Elephant and Rhino Research Symposium, Vienna, Austria, Schuling, Munster.
5. *Rajankutty, K. 2004: Foot disorders and its care in elephants Resource materials of refresher course on healthcare and management of Asian elephants. Elephant Study Centre, College of Veterinary and Animal Sciences, Mannuthy, Thrissur, Kerala, pp. 150 – 152.
6. *Schmid, J. 1995. Keeping circus elephants temporarily in paddocks-the effects on their behaviour. Animal Welfare **4**: 87- 101.
7. *Sukumar, R. 2003. The living elephants. New York: Oxford University Press.
8. *Sukumar, R.1994. *Elephant days and nights*. Delhi: Oxford University Press.
9. Anonymous. 2003. *Guidelines for the control of Tuberculosis in elephants. The National Tuberculosis Working Group For Zoo & Wildlife Species. Available online:* www.aphis.usda.gov/ac/ElephTBGuidelines2003.html or www. elephantcare.org
10. Benz, A. 2005. The elephant's hoof: Macroscopic and microscopic morphology of defined locations under consideration of pathological changes. Dissertation, Veterinär-Anatomisches Institut der Vetsuisse-Fakultät Universität Zürich.
11. Cheeran, J.V. 1997. Section II. Health. In: *Practical elephant management: A handbook for mahouts*. Namboodiri, N. (ed.) Coimbatore, Elephant Welfare Association.
12. Clubb, R. and Mason, G. 2002. A review of the welfare of zoo elephants in Europe: A report commissioned by the RSPCA. Oxford, U.K., University of Oxford, Animal Behaviour Research Group, Department of Zoology.

13. Kurt, F. 2005. History and Biology of Traditional Elephant Management. First European Elephant Management School Nov. 2005. pp: 9.

*: Original not referred

Section 5
Captive elephants under private ownership in Karnataka State

Section 5a
Captive elephants of Aane-Mane Foundation

Executive summary

Aane-Mane Foundation is a non-profit organization, based at Dubare, Karnataka, working towards conservation of Asian elephants, welfare of captive elephants and imparts traditional knowledge in handling elephants.

Elephants maintained by the Foundation were observed along with interviewing of personnel; the data collected was used for assessing the welfare status of both the elephants and their handlers. Data was collected through observation and interview of personnel/management. Each of these features has been rated on a 0 to 10 scale with 0 representing the worst possible situation and 10 implying a satisfactory state, closer to what an animal experiences in the wild.

The Foundation maintains three elephants, aged 2, 20, and 26, at Dubare; the young one was born to one of the females maintained by the Foundation during 2007. The adult females were purchased from Lohith District, Arunachal Pradesh, north-eastern India. Shelter for these elephants is in the forest area; hence, the overall mean rating for shelter and its related parameter is 9.5 suggesting the prevalence of satisfactory conditions for this parameter.

River is used for bathing and drinking; availability and access to running water sources, presence of landscape features for expression of species-typical activities and quantity of water consumed were considered and the mean rating for this parameter and the sub-parameter is 8.

The elephants walk with mahouts for 3-6 km from 9 a.m. to 12 noon every day. The elephants are allowed to range free in the forest; hence opportunity for walk is given high rating. Interaction is allowed between the elephants of Aane-Mane Foundation, as also with wild elephants. Mean rating for this parameter is 9.3 implying occurrence of satisfactory conditions.

Of the two adults, one elephant is described as calm, the other as nervous and no stereotypic behaviour is noticed. Mean rating is 8 reflecting satisfactory conditions.

Both the elephants are not assigned any work; they are free to range anyway they like and there is interaction among the three and wild elephants; this forms part of their life and hence rating for this parameter is 10.0.

Food provisioning is both free ranging and stall-fed. The food provided is: paddy: 45 kg for one ration, Hay - 5.5 to 6 kg, Banana - 2 dozens per day, Vegetables and fruits - 1 kg. The mean rating assigned is 8 which reflects satisfactory conditions.

Both the elephants were exposed to males and were reported to be cycling; one female has given birth, despite the absence of males; efforts were made to expose both the elephants to males, male captives as well as those from the wild. Hence, a rating of 10.0 is given for reproductive status parameter.

Veterinary doctor associated with the Forest Department is available, records are maintained, both clinical and behavioural; registration certificates are available for the elephants. Occurrence of disease/injury and provision of suitable veterinary facility and personnel were rated and the mean rating is 10.

Overall rating for mahouts, inclusive of socio-economic and professional status, is 7 implying prevalence of moderate conditions. Fifty seven percent of the all ratings score between 8 and 10 suggesting satisfactory conditions for more than half the sub-parameters observed.

Overall mean rating for elephants kept under Aane-Mane Foundation is 8 indicating occurrence of satisfactory conditions with 76% of all observed data getting a rating between 9 and 10.

A captive situation in which conditions of intrinsic biological importance to its elephants exist will lead to better welfare and health of its animals. The welfare ratings of Aane-Mane Foundation reflect such conditions.

Introduction

Aane-Mane Foundation is a non-profit organization with its field station based at Dubare, Madikeri District, Karnataka. It is working for the conservation of elephants and preserves traditional knowledge of handling elephants through interaction with mahouts. The Dubare Field Station is home to two adult female elephants and a 2 year-old male.

Objective

Elephants maintained by Aane-Mane Foundation at Dubare were observed along with interviews of personnel; the data thus collected was used to: assess the welfare status of the (i) elephants, and (ii) elephant handlers.

Method

Wild animals that have not been domesticated go through varying periods of stress when captive conditions are imposed on them. (Bradshaw, in press). Ferrier (1947) opined that the application of the knowledge of the natural habitats of wild elephants of the period when they were actively caught and put to work, would help in maintaining the animals in good condition even in captive conditions, if they are suitable. The welfare status of elephants maintained in captive conditions has been assessed based on the premise that deviations from the natural, wild, free-ranging environment experienced by captive animals have potential consequences on the welfare and well-being of the animals.

Conditions of elephants in captivity have been assessed in relation to physical environment, social and behavioural features along with the availability and access to veterinary personnel and facility. Data was collected through observation and interview of personnel/management. Each of these features (sub-parameters) has been rated on a 0 to 10 scale with 0 representing the worst possible situation and 10 implying a satisfactory state, closer to what an animal experiences in the wild.

Rating values were graded in the following manner:

- 0 to 2.4: Bad conditions
- 2.5 to 4.9: Poor
- 5.0 to7.4: Moderate
- 7.5 to10.0: Satisfactory

For some sub-parameters such as availability of veterinary doctors, frequency of visits by the doctor, etc., the ideal condition represents ease of access and prevalence of features conducive to maintaining elephant health. Common sub-parameters have been grouped together to form a parameter. For instance, aspects of shelter/enclosure such as type, size, flooring, hygiene maintenance, etc. are grouped under the parameter shelter. Rating for a parameter is the mean across individual ratings considering all sub-parameters observed. Results depicting sub-parameters show rating for both elephants, except where they are shown separately. Percentage occurrence of rating from 0 to 10 has been depicted in a graph to show the distribution of values from bad to satisfactory conditions.

The welfare status of mahouts/handlers has been assessed by examining the socio-economic parameters and the handler's relationship with his animal in terms of experience, knowledge of commands, etc. Bad or poor welfare of the handler may result in poor handling of his animal.

Results

Population status

The Aane-Mane Foundation maintains two adult female elephants, aged 20 and 26 years, at Dubare, and a baby elephant born to one of the females.

Source of elephants

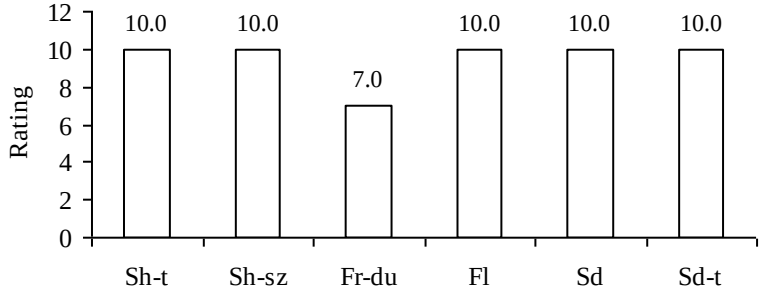
Both the elephants have been purchased from Lohith District, Arunachal Pradesh. Mar (2007) reports higher mortality rate among wild elephants raised in captivity, providing an indication of the importance of source of the captive animal. High rating is given for captive-born elephants. Rating is 2.5 (N = 2) implying purchase and transfer across owners, as both elephants were bought from owners in Arunachal Pradesh.

Shelter

- Forest area
- Vast space

Physical conditions of housing provided for the elephants have been rated. High rating is given for provision of natural conditions. Overall mean rating was 9.5 (SE = 0.4, N* = 12) implying satisfactory conditions (N* refers to the number of individual ratings across the sub-parameters observed, considering both the elephants).

The occurrence of natural, forest conditions as the physical space provided for captive elephants has been given high rating. Rating is 10.0 for both the elephants. Occurrence of natural substrates such as earthen floor was given high rating (Figure 1). Rating is 10.0 for both the elephants as they were provided natural forest conditions. Elephants are reported to range several kilometers (Sukumar, 2003) across varied habitat while foraging/feeding (McKay, 1973). Hence, availability of extensive areas as shelter habitat has been given high rating. Rating is 10.0 for the elephants kept under this regime.



Sh-t: Shelter type Sh-Sz: Shelter size Fr-du: Free range duration
Fl: Flooring Sd: Shade availability Sd-t: Shade type

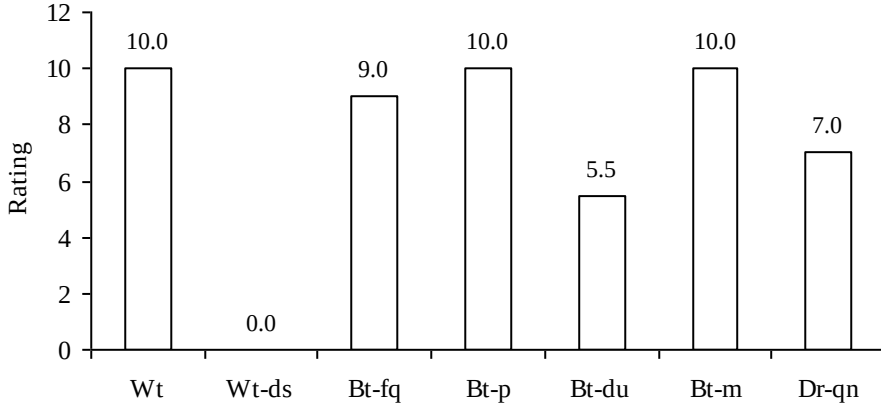
Figure 1: Rating for shelter sub-parameters.

Water

- River, for bathing and drinking
- Distance: 1.5 km
- Bathing number of times: twice/day, duration: 1.5 h
- Bathing materials used: *mundakai* (Pandanus sp.)

Availability and access to running water sources, presence of landscape features for expression of species-typical activities and quantity of water consumed were considered for this parameter. Mean rating is 7.8 (SE =1.1, N* = 14) implying satisfactory conditions (N* refers to the number of individual ratings across sub-parameters observed, considering both the elephants).

Running water sources such as rivers have relatively less contamination following usage; hence they have been given high rating. Rating is 10.0 for both the elephants. Easy accessibility to water source is given high rating. Considering that the elephants are walked to the source for their bathing routine, rather than allowing them unlimited usage of water, rating is 0.0 for both the elephants as water source is at a distance of more than a kilometer. Provision of a bathing place which allows for performance of species-specific activity is given high rating (Figure 2). Rating is 10.0 for both the elephants as they are taken to a river. When elephants are allowed to range free, quantity of water taken is assumed to be a function of the duration of free range. Rating is 10.0 for both the elephants as they are allowed to graze for 18 to 20 h in the forest.



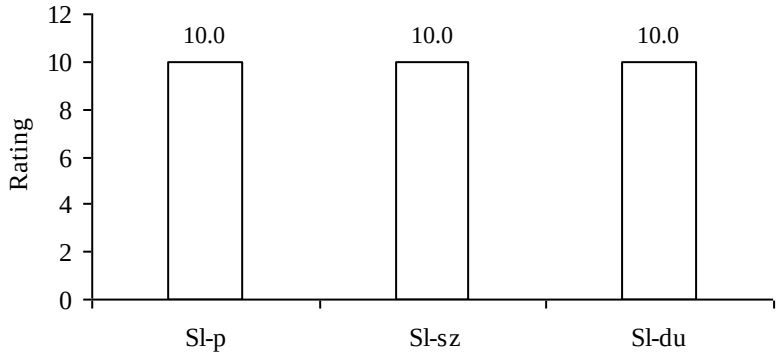
Wt: Perennial water source Wt-ds: Distance to water source
Bt-fq: Bathing frequency Bt-p: Bathing place
Bt-du: Bathing duration Bt-m: Bathing materials
Dr-qn: Quantity of water consumed

Figure 2: Rating for water sub-parameters

Sleep and related features

- Rest provided, place: forest
- Sleeping place: forest
- Duration of sleep: 4.5 h at night

Sleeping for normal duration as observed among wild elephants, access to suitable substrates and space are given high rating (Figure 3). Mean rating is 10.0 (SE = 0.0, N = 6). Elephants allowed to use forest areas are given high rating. Rating is 10.0 for both the elephants. Elephants sleep for 3 to 4 h (Zepelin *et al*., 2005). Deviations from this norms are assigned low scores. Rating is 10.0 for both the elephants.



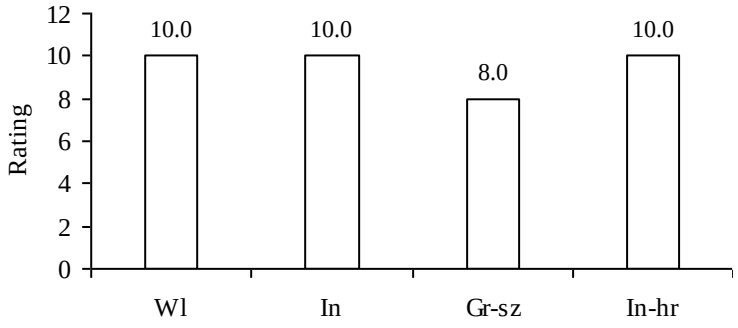
Sl-p: Sleeping place Sl-sz: Sleeping area (size) Sl-du: Sleep duration

Figure 3: Rating for sleep sub-parameters

Walk and social interaction

- Walking with mahouts for 3 to 6 km from 9 a.m. to 12 noon
- 24-hour interaction provided
- Number of animals two, (three, with the birth of a baby elephant)

The elephants are allowed to range free in the forest; hence opportunity for walk is given high rating. Interaction is allowed between the elephants (Figure 4), as also with wild elephants. Mean rating is 9.3 (SE = 0.5, N= 6) implying satisfactory conditions.



Wl: Opportunity for walk In: Opportunity for social interaction
Gr-sz: Group size In-hr: Interaction duration (h)

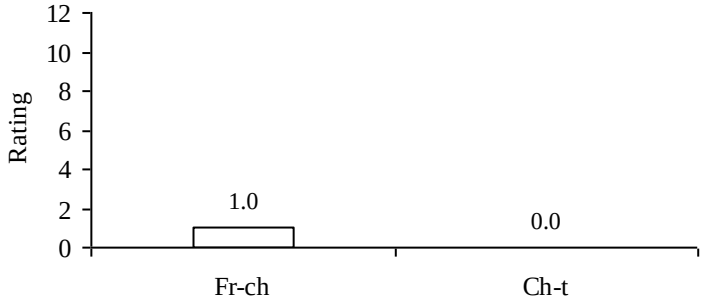
Figure 4: Rating for walk and social interaction sub-parameters

Chaining

- Grazing most of the time in forest, 18 to 20 h
- Chained for one hour
- Free ranging with hobbles and drag chain
- Leg chain dimension: 57 kg, 8 mm thick, 3 m length
- Body chain dimension: 15 kg, 8 mm thick, 10 m length
- Free ranging distance: 5 to 15 km, duration across season: 13 to 15 h
- Allowed to range free at night

Use of chains to keep tabs on captive animals is an age-old practice, practiced widely by the British for their work-elephants in Burma (Ferrier, 1947) and Assam (Stracey, 1963). The practice of chaining can be counter-productive considering the potential consequence of abrasive action of the chains on the elephant's skin (Kurt and Garai, 2007) and efforts by the elephants to walk, as a result of being hobbled. This parameter has been rated considering chaining aspects while the elephants are allowed to range free. Mean rating is 0.5 (SE = 0.3, N* = 4) indicating bad conditions.

High rating is meant to reflect increased duration of free range without chains on the elephant. Rating is 1.0 for both the elephants as they are allowed to range free for nearly 20 h with chains. Rating is 0.0 (Figure 5) as the elephants were hobbled, in addition to having a drag chain.



Fr-ch: Free-ranging duration with chains Ch-t: Chain type while free -ranging

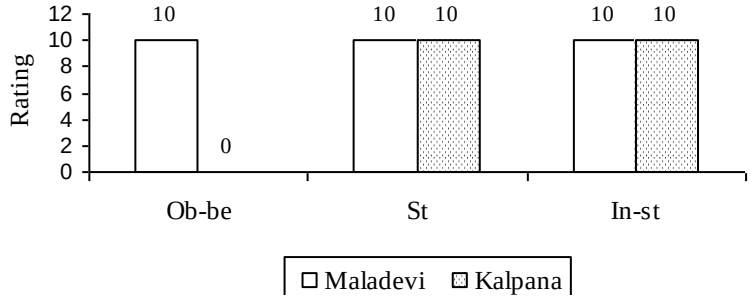
Figure 5: Rating for chain sub-parameters

Behaviour

- One elephant is described as calm, the other nervous
- No stereotypic behaviour noticed

This parameter is designed to show the temperament of the elephant along with occurrence of aberrant behaviours, if any. Mean rating is 8.3 (SE = 1.8, N = 6) reflecting satisfactory conditions. Temperament is an indication of the ease with which people can handle the animal. It is also important to the animal itself in captive situations due to interaction with con-specifics amid human-induced limitations on movement. High rating is given for calm animals. Rating is 10.0 for one elephant and 0.0 for the other (Figure 6).

Rating for this feature is 10.0 showing both the elephants did not exhibit stereotypic behaviour.



Ob-be: Observed behaviour St: Occurrence of stereotypy
In-st: Intensity of stereotypic behaviour

Figure 6: Rating for behaviour sub-parameters

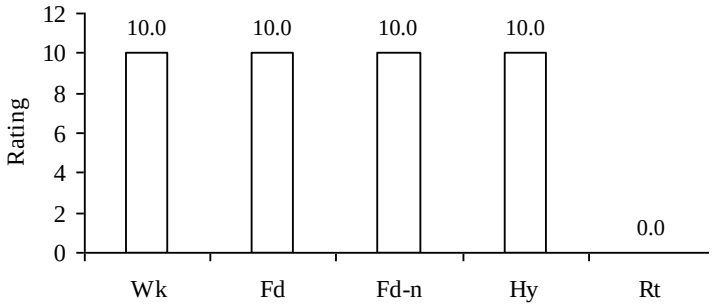
Work

Both elephants were not put to any work; free ranging in nature and interaction among the three and the wild elephants, forms part of their life, hence, rating for this parameter is 10.0.

Food provisioning

- Free ranging and stall-fed
- Paddy: 45 kg /day; hay- 5.56 kg, banana 2 dozens per day, Vegetables and fruits: 1 kg.

Provision of a variety of foods and opportunity to browse/graze freely along with organized feeding routine was considered. Mean rating is 7.5 (SE = 1.8, N = 8) representing satisfactory conditions. Opportunity both to range free and stall-feed was given high rating. Rating is 10.0 (Figure 7) for both the elephants. The management can use ration chart to plan for the animal's diet according to its health and physiological needs. Mean rating is 1.4 (SE =1.5, N = 7).



Wk: Work type Fd: Food provisioning type
Fd-n: No. of food items Hy: Hygiene of feeding place
Rt: Usage of ration chart

Figure 7: Rating for food sub-parameters

Reproductive status

- Both elephants reported to be cycling, exposed to males
- Male source: wild and captive

Normal reproductive functioning in adult elephants is considered to be associated with normal physical health (Kurt and Garai, 2007), opportunity for mating, among other related factors (Taylor and Poole, 1998). Mean rating is 10.0 (SE = 0.0, N* = 8). Despite the absence of males in the group, both the elephants have been exposed to males as efforts were made to expose them to male captive elephants and to range free in the forest. Hence, rating is 10.0 (Figure 8) for this sub-parameter. Opportunity provided for mating is said to be in the form of exposure to both captive and wild males. Hence, rating is 10.0 for this sub-parameter.

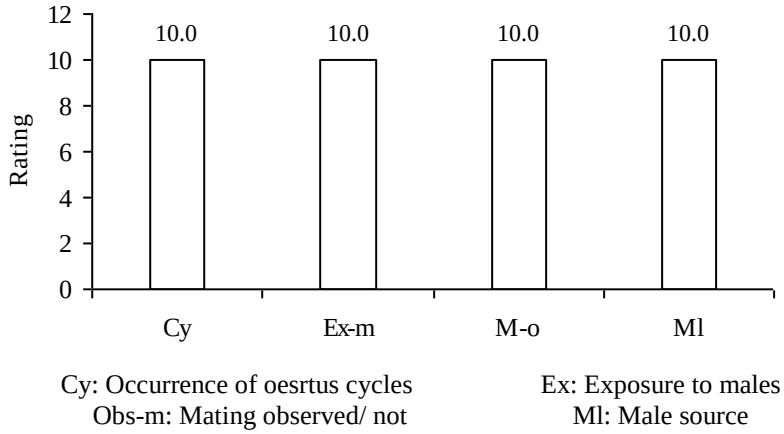
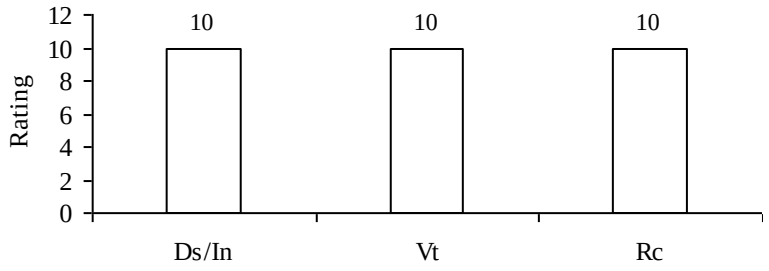


Figure 8: Rating for reproductive state sub-parameters

Health status and veterinary care

- Old rope wounds, healed now
- Veterinary doctor available, associated with Forest Department
- Records maintained: clinical and behavioural; registration certificate available for both the elephants

Occurrence of disease/injury and provision of suitable veterinary facility and personnel was rated. Mean rating is 10.0 (SE = 0.0, N* = 6). Records were maintained of clinical aspects such as de-worming/vaccination, etc. Hence, the rating is 10.0 (Figure 9).



D/In: Disease/Injury occurrence Vt: Availability of veterinary doctor
Rc: Record keeping

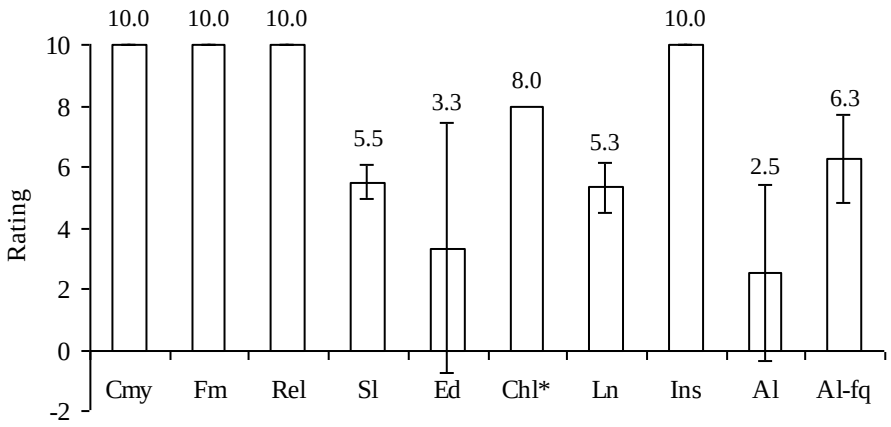
Figure 9: Rating for health and veterinary-care sub-parameters.

Welfare status of the mahout

- Two mahouts and two cawadis handle the elephants.
- Mean age is 26.5 years, (SE = 5.6, N =4) ranging from 19 to 40 years.
- Mean experience with specific elephant is 2.3 years, (SE= 0.7, N = 4) ranging from 14 years.
- The handlers belong either to Muslim community or Jenu Kuraba tribe having relatives working in the same profession.
- They seem to have received training in this profession.
- Mean annual salary is Rs. 29,950/- (SE = 2092.1, N = 4) ranging from Rs. 25,000–33,600.
- Both the mahouts are married, while both the cawadis are single.
- Accommodation is available (provided) for all the mahouts.
- Languages known: Kannada, Urdu, English or a combination of all.
- Three handlers used bamboo cane to control their elephants while two also use "Kokka" or "Kokkai" (round tiphook with wooden shaft).
- Insurance cover is available for three handlers.
- The number of mahouts changed for each elephant is 2.8 (SE = 2.3, N = 3).
- Three of the four handlers consumed alcohol, but after work.

Welfare of mahout/cawadi has been assessed based on his/her socio-economic status, along with his/her professional status in terms of experience, knowledge of commands and reason for choosing this profession. There were two mahouts, aged 20 and 26 years, and two cawadis, aged 20 and 19 years.

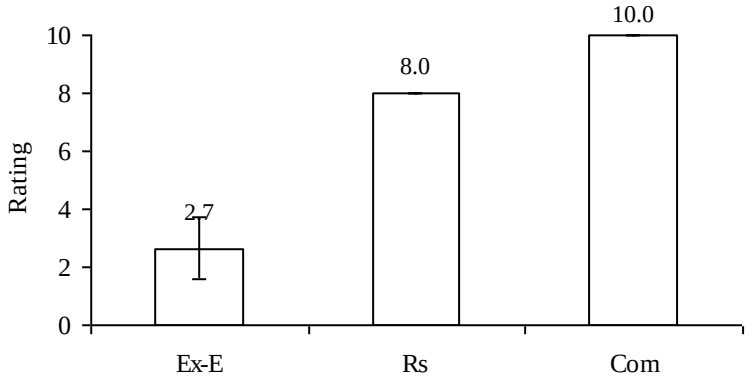
The socio-economic profile of handlers was rated to assess economic independence, literacy level, substance abuse as well as traditional association with this profession. Mean rating is 7.0 (SE = 0.7, N* =33) indicating moderate conditions (N* refers to the number of individual ratings considered across all the sub-parameters). Junior mahouts (cawadis) were said to be illiterate while one mahout had studied up to 10^{th} standard. Mean rating is 3.3 (SE = 4.1, N = 4). Mean rating for salary is 5.5 (SE = 0.6, N = 4) with three mahouts getting a rating of 6.0. Rating is 2.5 (SE= 5.0, N = 4) with three mahouts/cawadis said to consume alcohol (Figure 10).



Cmy: Community of mahout Fm: Family occupation Rel: Having mahout relatives
Sl: Salary given Ed: Education status Chl*: Number of children (Sample size = 1)
Ln: Number of languages known In: Insurance cover availability Al: Alcohol consumption
Al-fq: Consumption frequency

Figure10: Rating for socio-economic sub-parameters

This parameter rates the handler's experience with particular elephant or in the profession. Mean rating is 6.3 (SE = 0.9, N** = 13) showing moderate conditions (N** refers to the number of individual ratings across each of the sub-parameters observed). Higher rating value implies more experience in this profession, calculated as percent of mahout's age. Data was available for two handlers: rating for one mahout was 2.5, and for a cawadi 5.0, indicating poor conditions (Figure 11). Higher rating value indicates more experience with the elephant being observed, with experience being calculated as percent of the elephant's age. Mean rating value was 2.7 (SE = 1.0, N = 4) indicating occurrence of poor conditions for this sub-parameter.



Ex-A: Experience as % of mahout age Res: Reason for choosing this profession
Com: Knowledge of commands

Figure 11: Rating for professional status sub-parameters

Overall rating for mahouts, inclusive of socio-economic and professional status, was 6.8 (SE = 3.6, N* = 46) implying occurrence of moderate conditions. Fifty seven percent of the all ratings were between 8 and 10 (Figure 12) implying satisfactory conditions for more than half the sub-parameters observed.

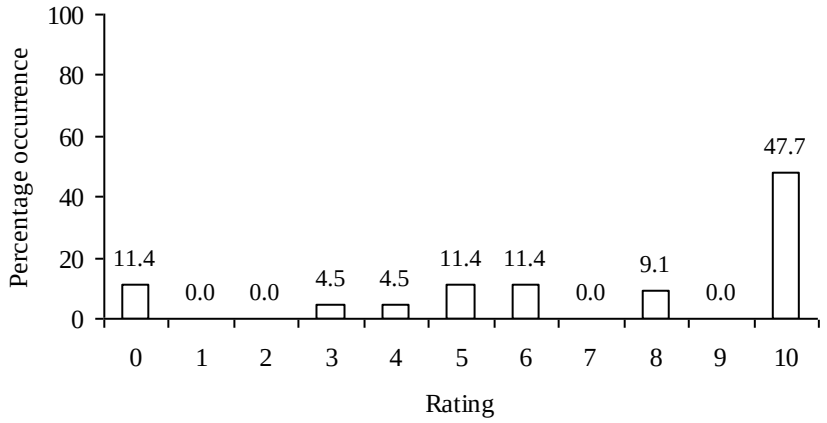


Figure 12: Percentage occurrence of overall rating

Overall mean rating for elephants kept under Aane-Mane Foundation, considering each value across all parameters/sub-parameters observed, is 8.4 (SE = 0.4, N = 75) indicating occurrence of satisfactory conditions with 76% of all observed data getting a rating between 9 and 10 (Figure 13).

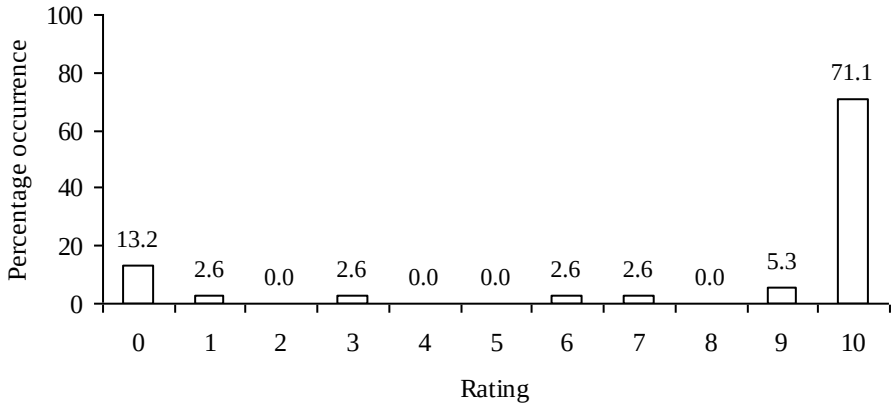


Figure 13: Overall rating for elephants

Discussion

Overall mean rating for elephants is 8 suggesting satisfactory conditions with 76% of all observed data getting a rating between 9 and 10.

High rating, using this method of evaluation, could be due to two reasons:

1. Factual representation of the actual situation.

2. Faulty presentation of welfare profile as a consequence of occurrence of only ten values in the observed data. This can happen when the observed data occurs in the form of a Presence/Absence set with only two possible values, 10 or 0, without providing any further insight into the data.

Overall data collected represented 53% of relevant information that could be collected. A total of 39 sub-parameters were rated. Contribution of ten ratings from "Presence/Absence" data was only 26% to the overall rating. Hence, this aspect of adding to high rating, for this organization, can be ruled out.

A captive situation which provides conditions of intrinsic, biological importance to its elephants may lead to better welfare and health of its animals. For the Aane-Mane elephants, welfare rating reflects the occurrence of such conditions. Both female elephants are provided with vast space in a forest area to range-free, browse/graze with access to a river, to engage in species-specific activities. Extensive systems of captivity which provide for a relatively high expression of species-specific behaviour/activity of their elephants have recorded breeding success while many elephants in intensive systems could be regarded as unfit for reproduction due to poor body growth associated with physical and psychological stress (Kurt *et al*., 2003/2004). The birth of a baby elephant by one of the female elephants at Aane-Mane recently, following mating with a wild male, adds value to this observation.

However, a negative aspect for these two elephants was the use of hobbles while ranging free. Kurt and Garai (2007) state that chaining the same region repeatedly may result in abrasion of the skin and consequent wounds which could be recalcitrant to treatment. They also stress on the importance of learning and development in a natural herd structure for wild elephants. The number of adults at the Aane-Mane group was only two. This situation may improve as a consequence of successful breeding of offspring.

Overall rating for mahout is 7 implying occurrence of moderate conditions. Fifty seven per cent of the all ratings were between 8 and 10 suggesting satisfactory conditions for more than half the sub-parameters observed.

Some features which were given low rating (less than 5) were:

1. Experience in the profession and with specific elephant: The incidence of people taking up this profession out of a need for employment rather than interest is on the rise (Lair, 1997). All the mahouts with this organization were given high ratings for community, family occupation and having relatives among mahouts indicating occurrence of suitable conditions. Their reason for joining this profession is said to be to continue a family tradition. This may not necessarily include a liking for the job of handling elephants. When interest in the job diminishes, there is likelihood of occurrence of conflict situation. However, this may be a temporary attitude and they could be interested in their jobs in the long run.

2. Consumption of alcohol: Three of the four mahouts seem to drink alcohol, but after work. Handling elephants is a 24-h job, hence, this practice may reflect on the care provided to the elephants.

References:

1. Bradshaw, G.A. (in press). Chapter 4. Inside Looking Out: Neuroethological Compromise Effects in Elephants in Captivity. In: An Elephant in the Room: the Science and Well Being of Elephants in Captivity. pp: 55 – 68. (Referred Online http://www.loudmonks.com/)
2. Ferrier, A.J. (1947). Care of Elephants in Burma. London, Messrs. Steel Brothers Co. Ltd
3. Kurt, F. and Garai, M.E. (2007). The Asian elephant in captivity—a field studies. Foundation books, Cambridge University press, New Delhi.
4. Kurt, F., Mar, K.U. and Garai, M. (2003/2004). Giants in Chains: History, Biology and Preservation of Asian elephants in captivity. Smithsonian Institution of Washington: Ethics and Elephants. (accessed online)
5. Lair, R.C. (1997). Gone Astray - The Care and Management of the Asian Elephant in Domesticity. FAO Regional Office for Asia and the Pacific, Bangkok, Thailand.
6. Mar, K. U. (2007). Myanmar Elephant Studbook: What are we Learning from Numbers? EU-Asia Link Project Symposium "Managing the Health and Reproduction of Elephant Populations in Asia" 8-10 October 2007 Faculty of Veterinary Medicine, Kasetsart University, Bangkok, Thailand, pp: 51 - 71.
7. McKay, G.M. (1973). Behavior and Ecology of the Asiatic Elephant in Southeastern Ceylon. Smithsonian Institution Press, City of Washington.
8. Stracey, P.D. (1963). Elephant gold. Nataraj Publishers, Dehradun.
9. Sukumar, R. (2003). The living elephants. New York: Oxford University Press.
10. Taylor, V.J. and Poole, T.B. (1998). Captive breeding and infant mortality in Asian elephants: A comparison between twenty western zoos and three Eastern elephant centers. Zoo Biology. **17**: 311-332.
11. Zepelin, H., Siegel, J.M. and Tobler, I. (2005). Mammalian Sleep. Accessed online: http://www.npi.ucla.edu/sleepresearch/Mammalian_Sleep.pdf

Section 5b
Captive elephants of Mysore Palace

Executive Summary

The royal palace of the erstwhile Maharaja of Mysore has been home to captive elephants for over a hundred years. Currently, the number of elephants maintained by the successors to the throne at the Regency Stud Farm in Mysore Palace is vastly reduced, numbering only seven.

Data was collected by observing elephants and interviewing of personnel/management. Each of these features has been rated on a 0 to 10 scale with 0 representing the worst possible situation and 10 implying a satisfactory state, closer to what an animal experiences in the wild.

The welfare status of mahouts/handlers has been assessed by looking at socio-economic parameters and the handler's relationship with his animal in terms of experience, knowledge of commands, etc. Bad or poor handler welfare maybe associated with poor handling of his animal.

There are seven elephants at the Palace, of which six are females. Their mean age is 30.5 years with the age of females ranging from 14 to 45 years. The single male was aged 20 years.

Shelter for the observed elephants is open, with earthen flooring, and of a size of 80,729 sq. ft. Mean rating for shelter is 4.0 and for the floor is 10 indicating suitable substrate.

The source of water for drinking/bathing is tap water at a distance of 200 m; an artificial pond is used sometimes for bathing. Mean rating for water-related parameters is 6 indicating the occurrence of moderate conditions for this parameter.

All the animals are walked 3 to 4 km surrounding the stud farm, and are allowed opportunity for interaction, the number of individuals ranging from 6 to 7 and the distance between animals ranged from 10 to 25 ft.

The elephants are allowed to walk; hence, rating of 10.0 is assigned for this feature and the mean rating for interaction is 6 indicating occurrence of moderate conditions.

The elephants are controlled with iron chains tied in the leg region; none is allowed to range free. Mean rating for chaining is 0.3 highlighting the existence of bad conditions for this parameter.

All the observed elephants are described as being calm, except for the single adult male elephant. Rating of 9 shows manageable temperament such as quietness/calmness.

Work type involves carrying tourists, 8 to 9 days/month, the distance covered is 50 m, 200 to 300 times a month and the mean rating for work is 3.

The elephants are given only stall feed, feeding area is an enclosure, and food provided ranged from paddy, rice, ragi balls, all grams, vegetables, jaggery, green grass, sugarcane, reed grass, to straw. Mean rating is 2 highlighting the existence of poor conditions.

Normal reproductive behaviour among adult animals is given high rating. For this parameter, data is limited to a maximum of two animals for some features and no information is available about the male.

Fissures on leg and toe nail cracks are reported for some elephants and injuries on leg, ear and tail for some; vet is available within 2 km from the stud farm. Mean rating related to health status is 8.

Mean rating for socio-economic status of mahout is six which reflects moderate conditions. Overall mean rating, including socio-economic and professional status for mahout is 7 indicating moderate welfare conditions.

Overall mean rating for elephant is 5, reflecting on the poor welfare conditions prevailing with 53% of ratings getting a score less than 5.

Poor welfare at this location maybe attributed to the following conditions as wild elephants are reported to spend 12 to 18 h a day foraging and feeding and may travel several kilometers in the process. Observed captive elephants at the location surveyed are used for commercial purposes, offering tourist rides for 8 to 9 days a month, leaving them without work the rest of the time.

Introduction

The Royal Palace of the erstwhile Maharaja of Mysore has been home to captive elephants for over hundred years. Camps currently run by the Forest Department for captive elephants in some locations were originally set up by than Maharaja of Mysore. Current numbers of elephants maintained by the present successors at the Regency Stud Farm in Mysore Palace environs is vastly reduced, numbering only seven.

Objective

Elephants maintained by the Regency Stud Farm were observed and data was collected to assess the welfare status of its captive elephants and their handlers.

Method

Providing an environment that meets the needs of a highly developed social species such as the elephant associated with a complex ecological requirement of space and food is a challenging task (Veasey, 2006). The deviations experienced by captive elephants in their social, physical, and biological environments have been used to evaluate the welfare of the animals. The greater the deviation from a natural environment, as experienced by wild counterparts, the lesser is the welfare of the animal in captivity. Captive conditions of the elephant have been assessed covering several aspects such as housing, whether allowed to browse/graze in forest conditions, opportunity for exercise/social interaction, group size, reproductive condition and health status, occurrence of stereotypy, etc. Data was collected through observation of elephants and interview of personnel/management. Each of these features or sub-parameters has been rated on a 0 to 10 scale with 0 representing the worst possible situation and 10 implying a satisfactory state, closer to what an animal experiences in the wild.

Rating values are graded in the following manner:

- 0 to 2.4: bad conditions
- 2.5 to 4.9: poor
- 5.0 to 7.4: moderate
- 7.5 to 10.0: satisfactory

For some sub-parameters such as availability of veterinary doctors, frequency of visits by the doctor, etc., the ideal condition represents ease of access and prevalence of features conducive to maintaining the health of the elephant. Sub-parameters representing a common feature such as shelter or water have been grouped together to form a parameter. Rating for a parameter is the mean of all the sub-parameters.

The welfare status of mahouts/handlers has been assessed by examining the socio-economic parameters and the handler's relationship with his animal in terms of experience, knowledge of commands, etc. Bad or poor handler welfare maybe associated with poor handling of his animal.

Results

Population status

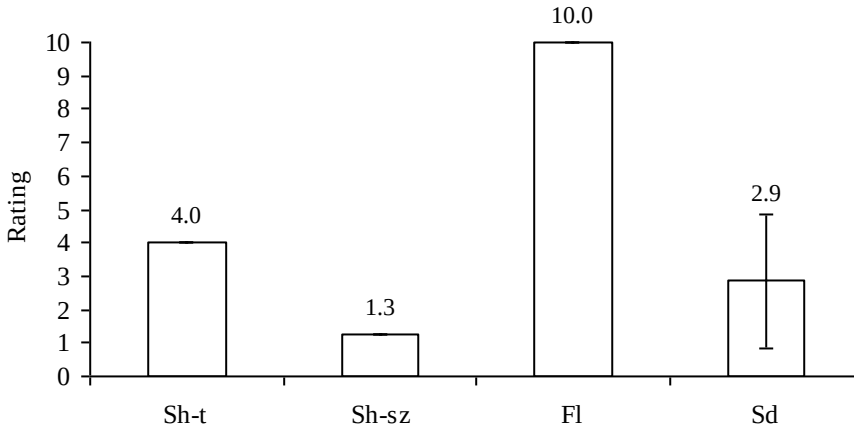
Elephants at the Regency Stud Farm, Mysore Palace, number seven, of which six are females. Their mean age is 30.5 yrs (SE = 5.3, N = 7) with the age of females ranging from 14 to 45 yrs. The single male is aged 20 yrs.

Shelter

- Shelter type is open, with earthen flooring
- Size is 80,729 sq ft
- Chaining duration is 16 to 18 h;13 h for male elephant
- Shade is available for two elephants only

Physical conditions existing within a shelter are of prime importance to captive animals as they determine the nature of facilities provided. The mean rating is 4.6 (SE = 2.2, N* = 4) implying existence of poor conditions. Occurrence of natural conditions within the shelter is given high rating considering the activity of wild elephants. The mean rating is 4.0 (SE = 0.0, N = 7) showing the poor condition of shelter. Occurrence of natural substrates such as earthen floor is given high rating. The mean rating is 10.0 (SE = 0.0, N = 7) indicating suitable substrate.

Rating for space available to the elephant is assigned based on the actual size of the shelter and the size (Figure 1) used by the elephants in the context of being restrained by chaining. The mean rating is 1.3 (SE =0.0, N =7) highlighting the bad conditions existing in terms of space.



Sh-t: Shelter type Sh-Sz: Shelter size Fl: Flooring
Sd: Shade availability

Figure 1: Rating for shelter and related parameters for elephants from Mysore Palace

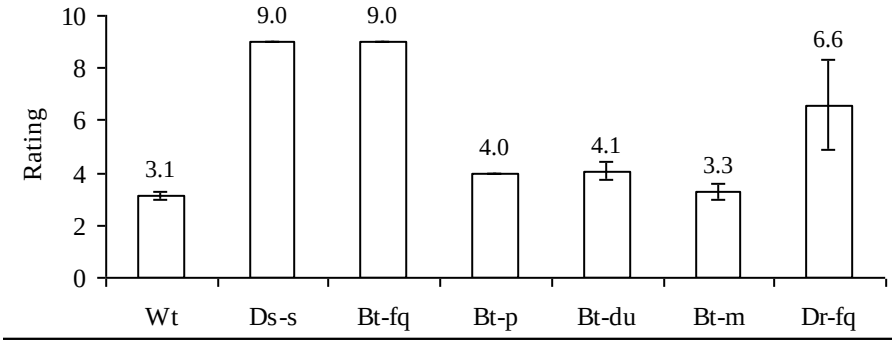
Water

- Source of water for drinking/bathing for all animals is tap water which is at a distance of 200 m.

- Artificial pond is available, and is used sometimes for bathing.
- Mean number of times drinking water per day is 4.6 (SE =1.2, N = 5).
- Mean quantity of water drinking/day is 150 l (SE = 40.8, N = 4).
- Mean bath duration is 1.0 h (SE = 0.2, N = 6).
- Bathing materials used are brush and pandanus fruit.

Availability of water along with appropriate features for performance of species-specific activities such as drinking/bathing wallowing is given high rating. Mean rating of 5.6 (SE = 1.1, N= 7) indicates the prevalence of moderate conditions (Figure 2) for this parameter. Running water sources available throughout the year have two advantages: relatively less contamination and availability. Mean rating is 3.1 (SE = 0.2, N = 7) showing poor water source.

The number of times water is taken by the elephant has been rated, as an indication of the quantity of intake. Mean rating is 6.6 (SE = 1.7, N = 5) which shows moderate conditions. Provision of a bathing place which allows for performance of species-specific activity is given high rating. Mean rating is 4.0 (SE =0.0, N =7).



Wt: Perennial water source Ds-s: Distance to water source
Bt-fq: Bathing frequency Bt-p: Bathing place
Bt-du: Bathing duration Bt-m: Bathing materials
Dr-fq: Drinking frequency

Figure 2: Rating for parameters of water for elephants in Mysore Palace

Sleep and related features

- All animals rest in palace premises/enclosure
- Shade was available for only two elephants
- Mean sleep duration is 7.0 h (SE = 0.0, N =6)

Access to unrestricted resting/sleeping activity in suitable space is rated. Mean rating is 3.0 (SE = 1.3, N = 3) implying prevalence of poor conditions for this parameter.

Place of sleep is rated considering the occurrence of natural and suitable substrates and provision for unrestricted movement. Mean rating is 4.0 (SE = 0.0, N =7) as the elephants

sleep in the enclosure/palace premises (Figure 3) which has suitable earthen flooring but no provision for unrestrained movement.

Kane *et al*. (2005) cite several authors in support of the activity pattern of wild elephants, and are said to be active for nearly 80% of a day. They sleep for 3 to 4 h only (Zepelin *et al*., 2005).

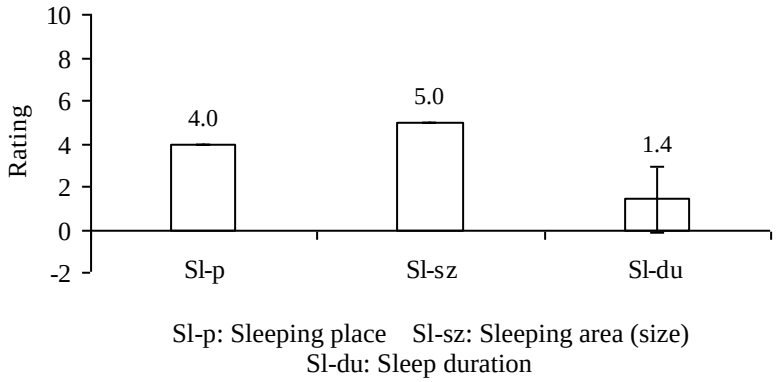


Figure 3: Rating for sleep-related parameters for elephants in Mysore Palace

Walk and social interaction

- All the animals are walked 3 to 4 km surrounding the stud farm.
- Time of walking is 8.30 to 9.30 a.m. and 3.30 to 5.30 p.m.
- Mean distance of walk is 4.1 km (SE = 0.6, N = 7).
- Mean duration is 2.3 h (SE = 0.2, N = 7).
- All the elephants are given opportunity for interaction.
- Number of individuals ranged from 6 to7.
- Distance between animals ranged from 10 to 25 ft.

McKay (1973) states that elephants traverse across varied habitats while foraging. Opportunity provided to captive elephants for walking is rated to provide an insight into the deviation experienced by the animals. All the elephants are allowed to walk; hence the rating of 10.0 for this feature.

Elephants are considered to be highly social animals (Sukumar, 2003), hence, opportunity for expression of species-typical behaviour among con-specifics is rated. Mean rating is 6.0 (SE = 3.7, N =3) indicating occurrence of moderate conditions (Figure 4).

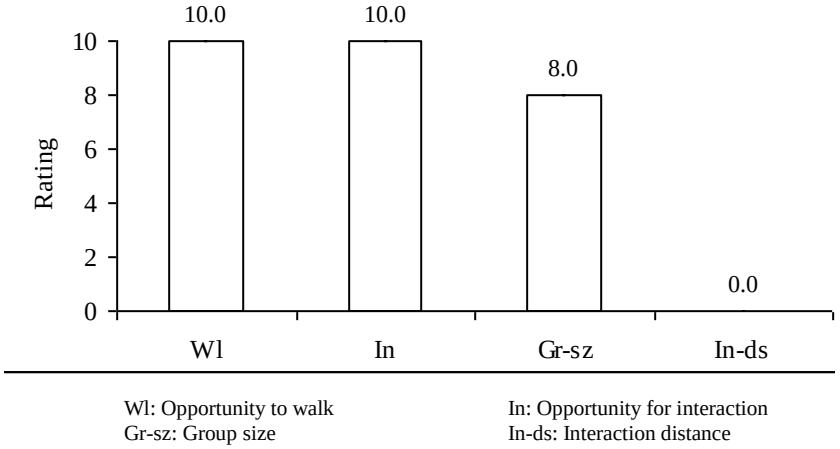


Figure 4: Rating for parameters of walk and social interaction for elephants in Mysore Palace

Chaining

- All the elephants are chained using iron chains
- Chain is tied in the leg region
- Chain weight ranges from 12 to 50 kg; chain length ranged from 6 to 20 ft
- Mean chaining duration is 18.8 h (SE = 0.5, N = 5)
- Neck rope for one elephant is 12 ft in length
- The elephants are not allowed to range free at night

Restricting the movement of captive elephants by chaining imposes limitations on the ability of the animal to express its natural behaviour in different contexts. Mean rating is 0.3 (SE = 0.4, N = 3) highlighting (Figure 5) the existence of bad conditions for this parameter.

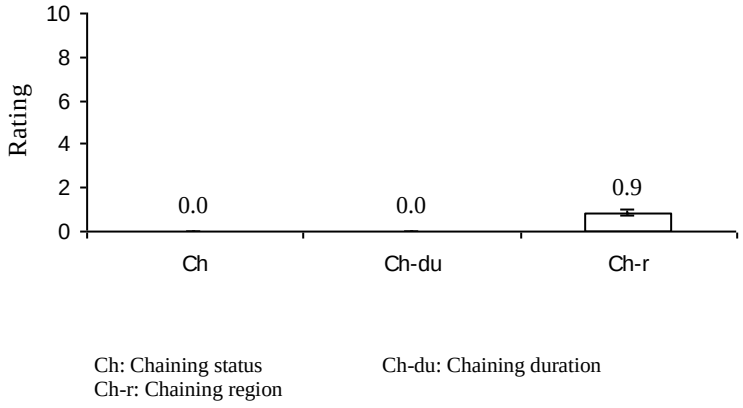


Figure 5: Rating for chaining of elephants and related parameters

Behaviour

- All the observed elephants are described as calm/predictable
- The male is described as predictable and rough
- Three elephants exhibited stereotypic to and fro movements

The temperament of captive elephants is important not only in terms of handling the animal, but also for the animal itself in terms of its interaction with con-specifics and opportunity for free movement. In addition, the occurrence of stereotypic behaviour has (Figure 6) been considered; it maybe linked to poor welfare and the animal's way of coping with it (Veasey, 2006). Mean rating is 7.8 (SE = 1.1, N = 4).

All the observed elephants are described as being calm, except for the single adult male. Rating is 8.6 (SE = 1.5, N = 7) showing manageable temperament such as quiet/calm. Rating for this feature is 5.7 (SE = 2.2, N = 7) indicating occurrence of stereotypy in some (50%).

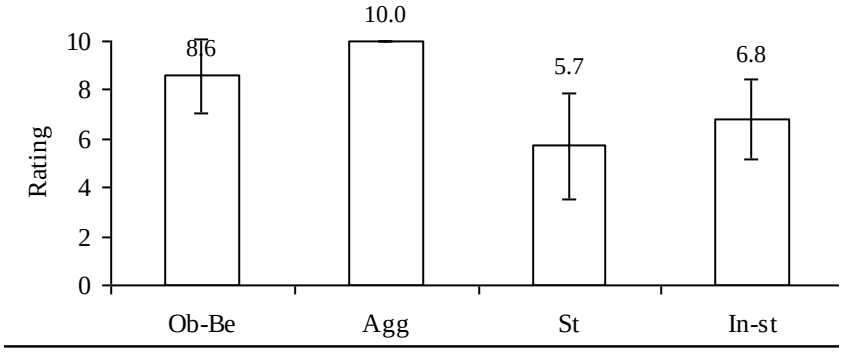


Figure 6: Rating for behaviour-related parameters for elephants from Mysore Palace

Work

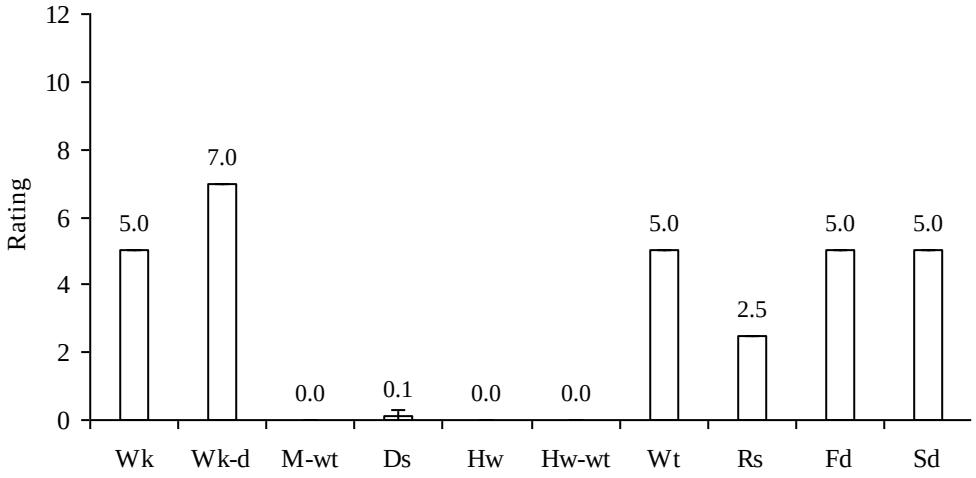
- Work type was carrying tourists, 8 to 9 days/month
- Timings: 10 to 2 p.m., 3 to 6 p.m
- Maximum weight carried is 450 to 500 kg.
- Distance covered is 50 m, 200 to 300 times
- Number of people: 3 to 6, nature of terrain: palace grounds
- Metal howdah used weighs 120 to 50 kg
- Tree shade available during work
- Water available, quantity of water said to be drinking: 7590 l.
- Rest available: 11.5 h

- Food provided during work: tree leaves of different species and green grass 75–80 kg

This has been rated considering the nature of work (performance of un-natural behaviours) and availability of food/water/shade/rest during work. Mean rating for work is 2.96 (SE =0.91, N = 10) implying poor conditions.

Nature of work involves repeated performance of the same activity and hence is given a low rating. Mean rating is 5.0 (SE = 5.0, N= 7). Low rating indicates burdening the animal with weight, repeatedly during the course of work (Figure 7). Rating is 0.0 (SE = 0.0, N =7).

The elephants are given opportunity to rest; however, they cannot choose the resting periods. It is decided by the keepers. Rating is 2.5 (SE = 0.0, N = 7). Provision of water during work is rated based on unrestricted access. Rating is 5.0 (SE = 0.0, N = 7) showing poor conditions.



Wk: Work type Wk-d: Work duration Wt: Maximum weight carried
Ds: Distance covered during work Hw: Howdah type Hw-wt: Howdah weight
Wt: Water availability Rs: Rest availability Fd: Food availability Sd: Shade availability

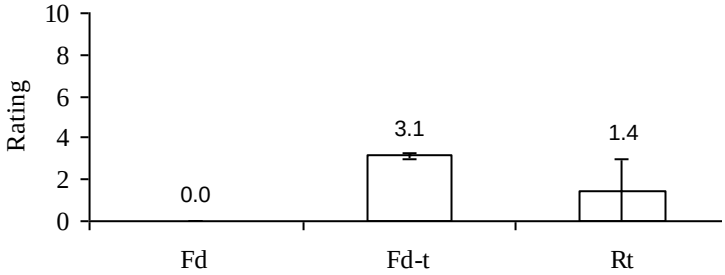
Figure 7: Rating for work for elephants of Mysore Palace

Food provisioning

- All the elephants are only stall-fed
- Feeding area is an enclosure, feeding time: 10 to 11a.m., 5 to 6 p.m
- Food: Paddy, rice, ragi balls, all grams, vegetables, jaggery, green grass, sugarcane, reed grass, straw
- Quantity of food (kg): free leaves 120 to 125, green grass (20), jaggery (raw concentrate) of sugarcane juice) vegetables
- Special food sugarcane- provided during ‘Dasara’

Ration chart is used for only one elephant. Provision to range free and availability of diverse types of food through stall-feed are considered along with the maintenance of feeding charts. The mean rating is 1.5 (SE = 1.1, N = 3) highlighting the existence of poor conditions.

- Elephants allowed to range free for foraging and given stall-feed have been given high rating. The mean rating is 0.0 (SE = 0.0, N= 7). Usage of ration chart can assist in planning for the animal's diet according to its health and physiological needs. The mean rating is 1.4 (SE =1.5, N = 7) for food-related parameter (Figure 8).



Fd: Food provisioning type; Fd-n: No. of food items; Rt: Usage of ration chart

Figure 8: Rating for food for captive elephants of Mysore Palace

Reproductive status

- Three elephants are reported to be cycling
- Two animals observed to have mated, no offspring

The occurrence of normal reproductive behaviour among adult animals is given high rating. For this parameter, rating for individual elephants has been presented as data is limited to two animals for some features.

No information is available on the male elephant. The rating presented in the figure for reproductive status-related parameters (Figure 9) represents that of four female elephants with their age given below:

Sita: 40 yrs
Ruby: 45 yrs
Chanchal: 30 yrs
Preeti: 20 yrs

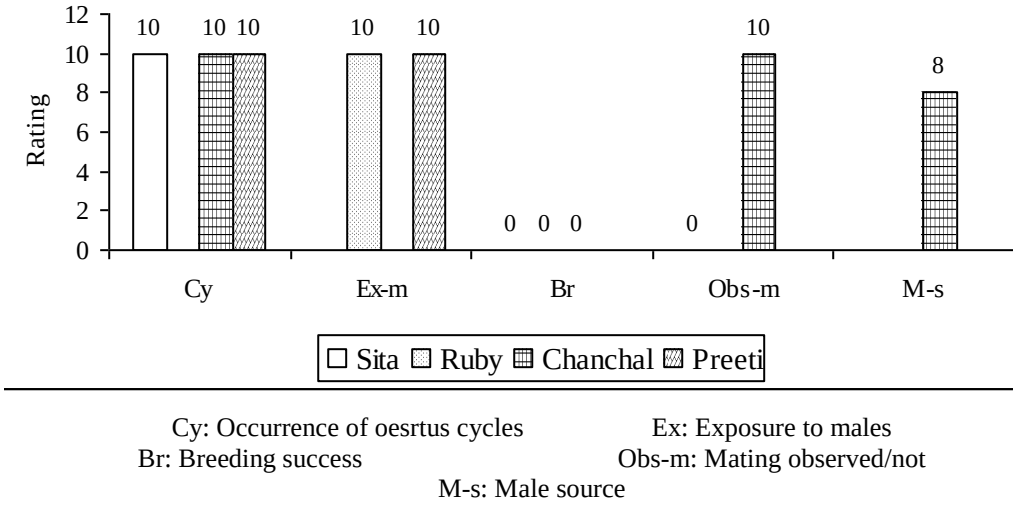


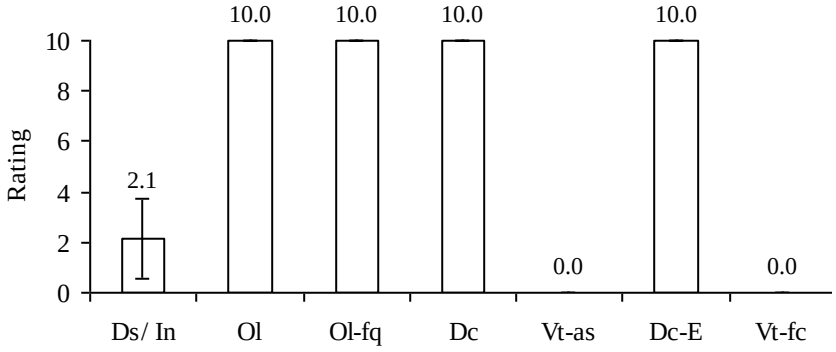
Figure 9: Rating for reproductive status-related parameters for captive elephants of Mysore Palace

Health status and veterinary care

- Fissures on leg and toe nail cracks reported for two elephants
- Injuries on leg, ear and tail for three elephants
- No signs of harsh handling
- Oiling is done for all the elephants on the head and legs, once daily,
- Head—Castor oil, Leg—Neem oil
- Doctor available for all observed elephants, located 2 km from the stud farm
- Veterinary assistant or clinic facility not available

This parameter considers disease/injury occurrence as well as practices followed in maintaining health. Mean rating is 7.6 (SE =2.9, N = 3). Availability of veterinary care is rated based on access to veterinary doctor, assistant, experience of the doctor and facilities. Mean rating is 5.0 (SE= 3.3, N = 4). Rating is 2.9 (SE = 2.0, N = 7) with five of the seven elephants said to have injuries on various parts of the body. Two elephants also seem to have foot-related problems.

The rating is 10.0 (SE = 0.0, N = 7) showing that all the practices (Figure 10) are followed for all the elephants. All the elephants have access to a veterinary doctor, hence, the rating is 10.0 (SE= 0.0, N =7) for this sub-parameter. There is no provision for clinical facility for the animals. Hence, the rating is 0.0 (SE = 0.0, N =7).



D/In: Disease/Injury occurrence Ol: Oiling done
Ol-fq: Frequency of oiling Dc: Availability of veterinary doctor
Vt-as: Availability of veterinary assistant Dc-E: Veterinary doctor's experience with elephants
Vt-fc: Availability of veterinary clinic facility

Figure 10: Rating for health and veterinary care-related parameters of captive elephants of Mysore Palace

Welfare status of the mahout

- Mean age of mahouts is 26.4 yrs (SE =2.3, N = 7)
- Mean experience in the profession is 14.7 yrs (SE =5.9, N = 6)
- Mean experience with the present elephant is 6.7 yrs (SE =2.1, N = 6) ranging from 4 to 40 yrs
- All the mahouts, except one who took up work as he was poor, had joined the profession as it is traditional occupation for them
- Six mahouts belong to Muslim or Jenu Kuruba community; training was given for six mahouts
- Mean salary per year is Rs.32,092 /- (SE =2149.6, N = 6)
- Education ranged from 1st standard to 7th standard
- Two mahouts did not have accommodation facility
- All the mahouts (N = 6) were married with 1 to 3 children. All the mahouts knew two to three languages
- Six mahouts use wooden ankush and one uses ankush and stick
- Only one mahout had a health check-up
- None of the mahouts had insurance cover
- Only one mahout consumes alcohol

Welfare of mahout/cawadi (Figure 11) has been assessed based on his/her socio-economic status. Mahout/cawadi's professional status has also been rated in terms of experience, knowledge of commands and reason for choosing this profession.

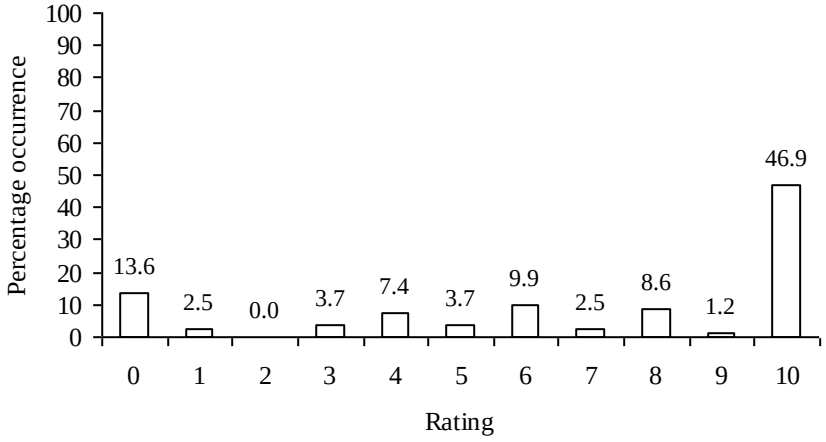


Figure 11: Percentage occurrence of overall rating for mahout welfare-related parameters for captive elephants in Mysore Palace

Mean rating for socio-economic status is 6.4 (SE = 0.5, N = 58) which indicates the existence of moderate conditions (N refers to the number of individual ratings considered across all the sub-parameters).

The mean rating for education (Figure 12) is 4.7 (SE =1.1, N = 6) as the maximum level of education is only the seventh standard. High rating is given for wages capable of supporting a family of four in an urban environment. The mean rating is 5.0 (SE = 0.5, N = 6) and only three of the mahouts get a maximum rating of 6. Low rating is given to mahouts who consume alcohol. The mean rating is 8.3 (SE= 1.8, N= 6) with five of the six mahouts do not consume alcohol.

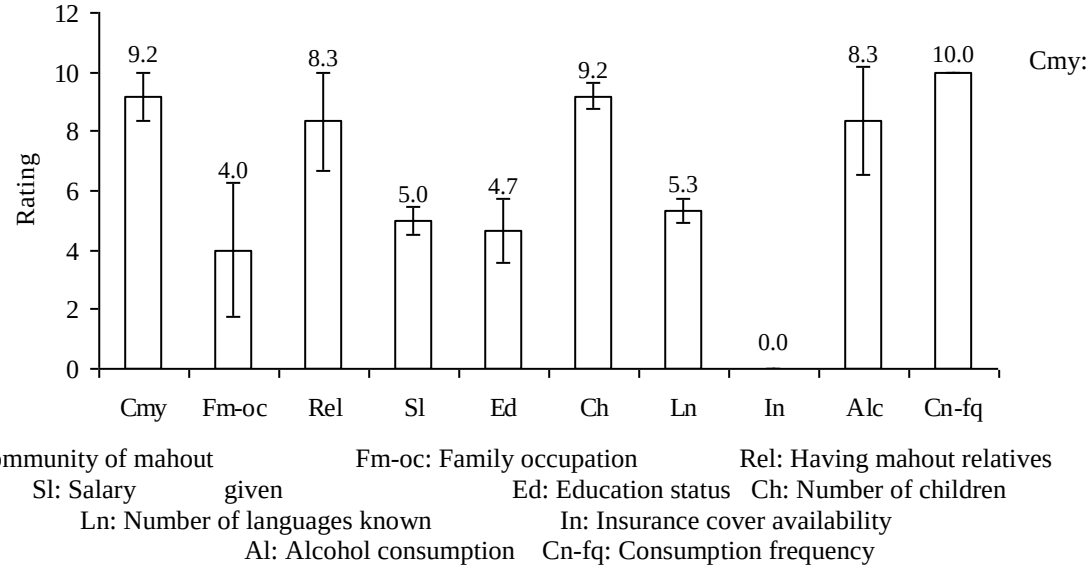
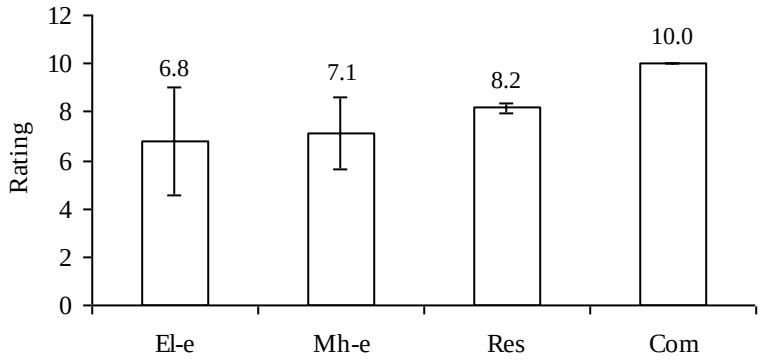


Figure 12: Rating for socio-economic parameters for mahouts.

The mahout's professional status is rated based on the handler's experience with particular elephant or in the profession. The mean rating is 8.1 (SE = 0.6, %CV = 34.8, *N*** = 23) showing satisfactory conditions (*N*** refers to the number of individual ratings across each of the sub-parameters observed).

Higher rating implies greater experience in this profession (Figure 13), calculated as percent of mahout's age. Mean rating is 6.9 (SE = 1.6, N = 4) showing prevalence of moderate conditions. Higher rating value indicates more experience with the elephant being observed, with experience being calculated as per cent of the elephant's age. The mean rating value is 7.0 (SE = 1.8, N = 5) showing occurrence of moderate conditions for this sub-parameter.



Ex-A: Experience as % of mahout's age Ex-E: Experience as % of elephant's age
Res: Reason for choosing this profession Com: Knowledge of commands

Figure 13: Rating for professional status of mahouts of captive elephants of Mysore Palace.

The overall mean rating, including socio-economic and professional status, for mahout is 6.9 (SE = 0.4, N = 81) indicating occurrence of moderate welfare conditions (N refers to the number of individual ratings across all the sub-parameters observed). Ratings less than 5 indicate poor welfare conditions. This was seen for the following sub-parameters (Figure 14):

- Salary paid to the mahouts (Mean = 5.0, SE = 0.5, N = 6) which ranged from Rs. 28,000 to 38,700/- p.a.
- Absence of insurance cover for any of the mahouts.

The overall mean rating for elephants is 4.6 (SE = 0.2, N** = 326, where N** refers to each individual rating across all the parameters assessed). This rating reflects poor welfare conditions with 53% of ratings getting a score less than 5.

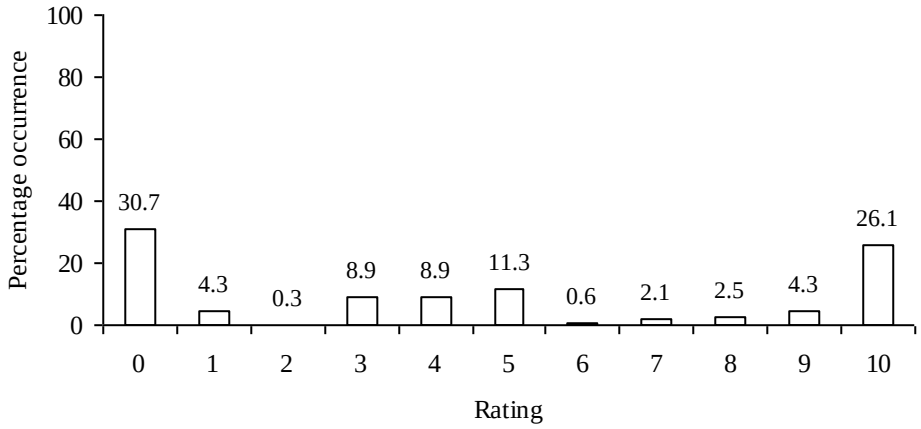


Figure 14: Percentage occurrence of overall rating for elephants.

Discussion

The deviation between the knowledge gained from wild elephant studies and the existing captive situation has been used to assess welfare of captive elephants. The overall mean rating is 4.6; it reflects on poor welfare conditions with 53% of ratings scoring less than 5.

Poor welfare at this location maybe attributed to the following:

- Wild elephants are reported to spend 12 to 18 h a day foraging and feeding (Sukumar, 2000) and travel several kilometers in the process.

Observed captive elephants at the location surveyed are used for tourist rides for 8 to 9 days a month, leaving them without any perceptible work the rest of the time. Stall-feed may reduce their need to forage; however, the absence of any activity for most parts of a day may have deleterious effect on the animals. Added to this, the elephants are chained at one place for nearly 12 to 18 h using chains of 15 to 20 ft in length, imposing restriction on their movement. Chaining increases frequency of stereotypy (Gruber *et al.*, 2000). Co-incidentally, three of the seven elephants exhibit stereotypic to and fro movements.

- Elephants are highly social animals, maintaining their association with other elephants across generations (Sukumar, 2003).

The observed elephants are allowed social interaction among each other offsetting the benefit by the practice of chaining them thus restricting their ability to move and interact freely, especially considering the possibility of negative interactions. Also, the use of the animals for tourist rides for nearly seven hours meant reduced time for interaction.

- Elephants forage on a variety of plants (Mckay, 1973) using different parts of their body to prepare this food (Kurt and Garai, 2007).

The elephants are not allowed to range free to forage and are provided only stall-feed. This practice will not provide the diverse plant types which free-ranging animals have

access to. Also, stationary feeding does not provide the exercise which these large-bodied animals need while foraging.

- Clubb and Mason (2002) state that lack of normal reproductive functioning could be linked to stress among the animals or harsh handling, among other physiological factors. Learning is an important aspect for social animals in the context of mating and care of offspring (Poole and Moss, 2008).

None of the observed female elephants, for which data is available, has given birth to offspring despite showing signs of oestrus or being allowed to mate.

Features of husbandry not conducive to elephant welfare:

- Use of metal howdah to provide rides for tourists. Kurt and Garai (2007) report of the ill-effects of using chains on the skin of elephants. Metal howdahs may lead to abrasion-related injury and cause discomfort during high ambient temperatures.
- Repeated performance of same behaviour within unchanging environs due to the practice of walking the elephants during rides, reportedly for 200 to 300 times/day.
- Absence of running water facility with suitable space for elephants to engage in natural behaviour such as immersing in the water/mud wallowing.

References

1) Clubb, R. and Mason, G. (2002). A review of the welfare of zoo elephants in Europe: A report commissioned by the RSPCA. Oxford, U.K., University of Oxford, Animal Behaviour Research Group, Department of Zoology.
2) Gruber, T.M., Friend, T.H., Gardner, J.M., Packard, J.M., Beaver, B. and Bushong, D. (2000). Variation in stereotypic behaviour related to restraint in circus elephants. Zoo Biology 19: 209-221.
3) Kane, J.D.L., Forthman, D., and Hancocks, D. (2005). Optimal Conditions for Captive Elephants: A Report by the Coalition for Captive Elephant Well-Being.
4) Kurt, F. and Garai, M.E. (2007). The Asian elephant in captivity—a field study. Foundation books, Cambridge University press, New Delhi.
5) McKay, G.M. (1973). Behavior and Ecology of the Asiatic Elephant in Southeastern Ceylon. Smithsonian Institution Press, City of Washington.
6) Poole, J.H. and Moss, C.J. (2008). Elephant sociality and complexity The scientific evidence. In: Elephants and ethics toward a morality of coexistence (Eds: Wemmer, C and Christen, C. A) The John Hopkins University Press, Baltimore. (Accessed online: http://www.elephantvoices.org/index.php?topic=tools&topic2=tools/documents/2_Poole_Moss_Final_7_12_06.pdf).
7) Stroud, P.C. (in press). Chapter 8. Tradition, Biology and Morality in Captive Elephant Management, In: An Elephant in the Room: the

Science and Well Being of Elephants in Captivity. pp: 99–108. (Referred online http://www.loudmonks. com)
8) Sukumar, R. (2000). Asian Elephant (*Elephas maximus*). In: Reading, R.P. and Miller, B. (eds.). Endangered Animals: a reference guide to conflicting issues. Greenwood Press, Westport, Connecticut, London, pp. 34–39.
9) Sukumar, R. (2003). The living elephants. New York: Oxford University Press.
10) Veasey, J. (2006) Concepts in the care and welfare of captive elephants. Int. Zoo Yb. 40: 63–79
11) Zepelin, H., Siegel, J.M. and Tobler, I. (2005). Mammalian Sleep. Accessed online: http://www.npi.ucla.edu/sleepresearch/Mammalian_Sleep.pdf

Section 6:
Captive elephants in Circus

Executive summary

Captive elephants encounter a number of hurdles, unnatural and unfamiliar, over which they have no control, which are inexperienced by the wild elephants. The Russian Jumbo Circus (curiously named after a popular synonym for elephants) maintains seven elephants which it uses in its shows.

These elephants were assessed for their welfare status in terms of their physical environment, opportunities for expression of their natural behavioural repertoire, physiological and health status. Management practices adopted regarding feeding, bathing, work type and other daily routines were also investigated.

Apart from a detailed qualitative investigation of these aspects, each of these parameters was rated on a scale of 0 to 10, with 10 representing the best living conditions for the animal as experienced by it in its wild state and 0 the worst living condition relevant to that parameter.

There are seven elephants in the circus; one male and six females. Four of these had been purchased from other sources, including other circuses. However, no records were available for inspection, as also the registration details.

Ratings for 'origin of the elephant' were low (mean rating of 4) and only one calf seems to have been born in the circus, but no documents support the claim. Mean rating for 'purpose in keeping the elephant' was 0, indicating commercial use under unnatural conditions.

The elephants were tied by chains under a tent or "awning" with mud floor and since they were kept in the same place for over 20 h a day, they had unhygienic surroundings. Their urine is collected on the ground, making it muddy and slippery.

Mean rating for 'shelter type' was 2.5 indicating structurally enclosed unnatural space for the animals.

Water was procured in tankers; 45 buckets were made available to the animals each time, and its availability was poor. Mean rating for water-related parameters is 1, implying the absence of uncontaminated running water.

Opportunity for exercise (walking) was reported but being situated in the middle of a metro, problems such as sufficient space, suitable terrain and traffic density were factors to contend with.

The animals were allowed interaction among themselves, though the nature and the kind of interaction are not known.

Only one female was in oestrus and had given birth in 2001 (no records available to support this claim). With this exception, no elephant was allowed to mate. A female (15

years) wore a spiked chain, indicating the use of this device to control her restlessness and possible aggression.

Work involved monotony in daily routines, exposure to approximately nine hours of loud music, and an hour of exposure to 4000-watt halogen lamps which are a part of their work-life routine. Mean rating for 'work type' is 0.

All females showed stereotypic behaviour by swaying and swinging their trunks and body in repetitive movements; this may be reflective of the daily routine and of the fact that they are tied at one place for many hours at a time.

The elephants were used for three shows per day and three acts within each show e.g. "pooja", playing cricket and a procession of all the elephants with a woman seated on the trunk performing.

There are no records of the health of the animals, despite the fact that samples of blood were drawn and claims to their testing. A local veterinary doctor was said to be treating them when the need arose. Based on observations, nail crack of the right front leg of one female elephant and blindness in the right eye of another elephant were recorded.

None of the animals had been micro-chipped.

The elephants were looked after by eight mahouts of ages ranging from 18 to 30 years; their salary was in the range Rs. 3000 to 5500/month, exclusive of food, housing, uniform and healthcare. No regular health check-ups were conducted for the mahouts.

All the mahouts who had children showed no interest in their children joining the profession. This is significant since it implies that "mahoutry" is no longer a traditional occupation and that skills and knowledge are not passed down through the generations.

Forty-three per cent of the ratings for the elephants were in the category of 'bad' condition, the number of scores ranging from 7 to 10 constituted only 33% of all the scores.

The ratings in percentage terms provide interesting insights. Ratings of 0 and 10 each constituted 29% of all scores. Bad to poor rating values ranging from 1 to 4.9 constituted 28%, while moderate to satisfactory values ranging from 5 to 9 contributed just 14% of all scores.

Introduction

The Russian Jumbo Circus maintains seven elephants which it uses in its routine shows. This circus toured the state of Karnataka from September 2007 onwards, visiting Bangalore during January 2008.

Objective

Elephants maintained by the circus were observed and their keepers/manager were interviewed to record morphometric observations of the animals, their physical environment, behavioural data such as occurrence of stereotypy, health status, and management practices adopted regarding feeding, bathing, work type and other daily routines.

Methods

Ratings for 23 parameters (inclusive of sub-parameters) for the elephants were identified and analysed. No ratings were given for mahout/cawadi as enough information is not available.

Results

Status of the elephants

The circus had one male (Lucky Prasad 45 years) and six females (age: 7 to 30 years).

- Lucky Prasad, male, 45yrs
- Anarkali, female, 30 yrs
- Ashoki, female, 23 yrs
- Lakshmi, female, 9 yrs
- Ganga, female, 7 yrs
- Rani, female, 25 yrs
- Lucky, female, 15 yrs

The circus had been performing in Karnataka for eight months, beginning in September 2007 in Mysore, running shows in Bangalore in February 2008 and shifting to Mangalore thereafter.

Source of the elephants

Four of the seven elephants had been purchased from different sources including other circuses. However, no records are available. Registration details are also not available. The change in conditions which an animal undergoes as a consequence of being sold/ transferred to different owners implies a change in the way the animal is taken care of. High ratings have been given to captive-born animals followed by those that do not experience any drastic shifts in their living conditions.

Change in captive conditions, due to change in ownership, may lead to stress for the animal due to unsuitable and unfamiliar living conditions. Studies have shown that shifting of animals leads to breakage of social bonds, especially among females (Kurt and Hartl, 1995; Garai, 1992, Kurt and Garai, 2001) †, and a new and unfamiliar hierarchy among the animals (Kurt and Hartl, 1995; Garai, 1992).†

Mean rating was 4.0 (SE = 0.46, N = 5) with 80% of the elephants purchased (Figure 1). A single female elephant born to Anarkali (female, 30 years) is with the circus.

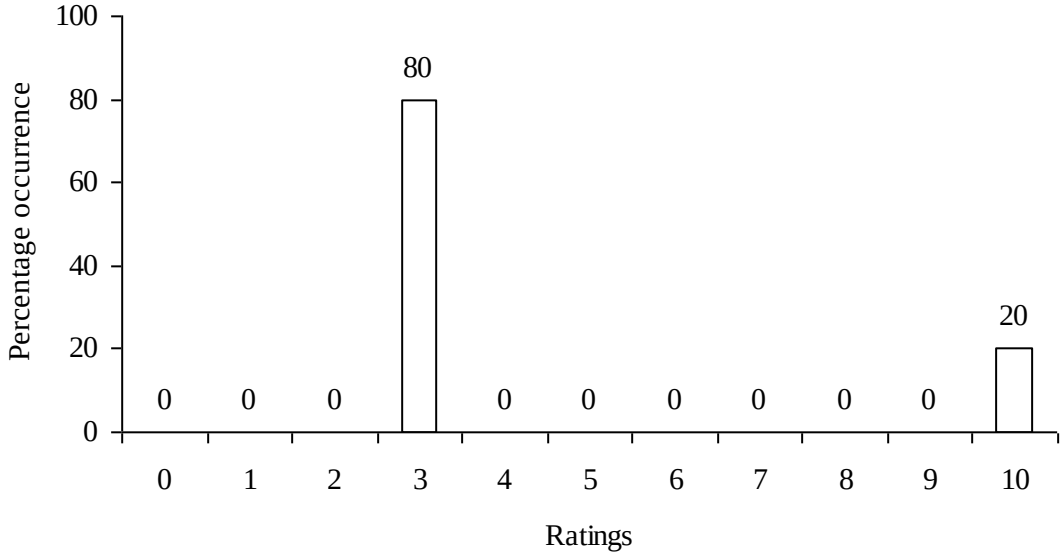


Figure 1: Percentage occurrence of mean ratings for elephant source in circus

Purpose of keeping

The purpose of keeping is solely for commercial reasons; when an animal is maintained for commercial use in unnatural conditions its welfare is reduced due to imposition of alien living conditions and the possibility of over-exploitation. Mean rating is 0 (SE = 0, N = 7) indicating commercial use under unnatural conditions.

Shelter

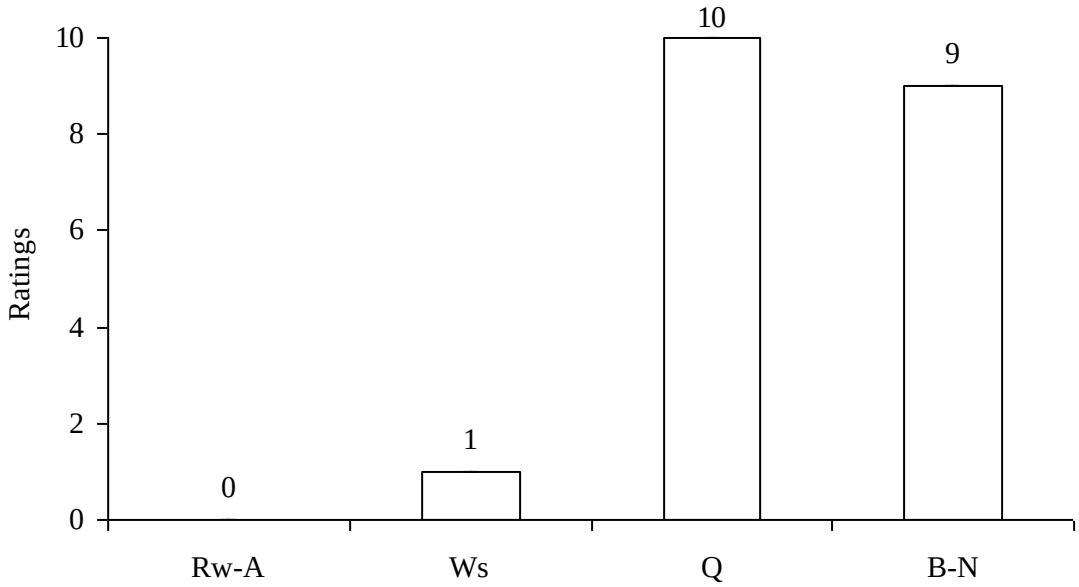
All the elephants were tied by chains under a 'shamiana' or tent, which had a mud floor. The shelter provided is rated based on the deviation from the natural conditions for the animal, with higher values indicating suitable shelter. Mean rating value was 2.5 (SE = 0, N = 7) showing occurrence of a structurally enclosed space. The rating for floor type was 5.0 (SE=0, N=7). The animals were tied for more than 20 h, with urine collecting on the mud floor, unhygienic and potentially dangerous condition as a slippery floor might result in serious injury to the animal.

Water

Water was brought in tankers and 45 buckets are given to every animal each time. The elephants drink water thrice a day and were bathed every day.

An important factor in the assessment of welfare of captive elephants is the availability of and access to water. This parameter was rated across four sub-parameters. Overall mean rating was 5.0 (SE=0.76, N=4) with ratings for sub-parameters in the range 0 to 10 (Figure 2). This rating implies existence of moderate conditions for water availability.

An important factor is the kind of water available. Other sub-parameters depend on this source of water. Rating for perennial source of running water was 0 (SE=0, N=7) indicating non-availability.



Rw-A: Running water availability
Ws: Source of water (drinking and bathing)
Q: Quantity of water drinking/day
B-N: No. of times bathing/day

Figure 2: Mean ratings for water parameters

Bathing is an important routine for the elephant. It improves skin health and helps in cooling their bodies amidst high temperatures (Shoshani and Eisenberg, 1982)†. Mean rating for water source (for bathing and drinking) is 1.0 (SE=0 N, =7) implying absence of uncontaminated running water. Also, the use of tankers to supply water for bathing indicates lack of sufficient space such as a lake or pond and insufficient quantity for the animal to completely immerse itself.

Sleep

Animals sleep between midnight and 3:00 a.m. and this feature is rated assuming that elephants are active during the day and sleep for around 4 h during the night. Wild elephants spend nearly 80% of their time walking and grazing (Sivaganesan and Johnsingh, 1995; Kane *et al.*, 2005). All the elephants were given an opportunity to sleep (Mean rating = 10, SE = 0, N = 7). The rating for sleep duration was 7.5 (SE=0, N =7) implying sleep for 3 to 4 h.

However, good rating values need to be considered in the context on restriction of movement imposed on the animal. All the animals were chained for a minimum of 20 h.

Restricted movement and lack of activity add to the stress of the animal as can be seen in the section on behaviour.

Opportunity for exercise

Elephants are walked for 5 km in a 2 h period every day. Walking is important to maintain the animal's health by regulating weight, obesity and in trimming their nails (Clubb and Mason, 2005). All the elephants were allowed to walk (Mean rating = 10, SE = 0, *N* = 7) for two hours every day. However, it should be noted that the animals were housed in the middle of a metro where conditions such as suitable terrain, variation in substrates to help maintain foot health (Fowler, 2001) [††]or ample space, are lacking.

Interaction

The animals are allowed interaction among themselves, though details of the kind of interaction and among specific individuals are not available. However, all the elephants are chained for more than 20 h a day. The animals are allowed to interact with other elephants also (Mean rating = 10, SE = 0, N = 7). This rating needs to be considered in the context of absence of free movement as the animals are chained for more than 20 h. Brockett *et al.* (1999) [††] report that chaining diminishes (among other related and important factors) natural socializing among the animals. Also, aggressive interaction may be stressful considering restricted movement.

Observed Behaviour

Behaviour of the male, Lucky Prasad (45 yrs) was reliable. One female elephant, Lucky (15 years) was controlled using a spiked chain on its leg, indicating that the animal was not calm. Ganga, the youngest elephant, was very restless. Stereotypic behaviour of medium intensity was expressed by all the female elephants in the form of swaying their bodies. The use of such chains is considered extreme as it is a source of constant pain for the animal and may lead to sores or open wounds in the foot due to rubbing against the skin, causing further distress in terms of health and/or psychological welfare of the animal.

The female elephants exhibited stereotypic behaviour (Mean rating = 0, SE = 0, N = 6) by moving their bodies. Mean rating for intensity was 2.5 (SE = 0, N = 6) implying medium level of stereotypy. Reports mention the practice of chaining animals linking to occurrence of stereotypy (Brockett *et al*., 1999)[††] and a lowering in such behaviour in circus elephants when left unchained (Gruber *et al.*, 2000) [††].

Work

The elephants were used in three shows a day. Each show involving the elephants lasted for 30 min. The acts performed were 'Pooja' for 10 min, playing cricket for 10 min, and a procession of all the elephants with a lady on the trunk of the leading animal for 10 min. Mean rating for work type is 0.0 (SE=0, N=7) implying performance of unnatural work. The purpose of maintaining elephants in circuses is to make them perform in front of an audience.

While the work itself may not be strenuous, repeated performance of an unvarying routine with no freedom for free movement, no change in daily activity and restriction imposed on independent socializing and other natural behaviour, would affect the psychological well-being of the animals by way of expression of listlessness, stereotypy, etc. All the females in the circus exhibited stereotypy.

Provision of food

All the elephants were stall-fed with the following feed:

a. Sugarcane
b. Paddy
c. Roti
d. Ghee

During summer, they were served leaves of the peepul tree, banyan tree or 'Bargat' and bamboo. Mean rating was 0.0 (SE=0, N=7) implying provision of only stall-feeding. Stall-fed animals are unlikely to access the range of food eaten by free-ranging animals in natural forests or even in semi-natural conditions. Hence, a low rating value has been assigned (Figure 3). Mean rating for the number of food items provided was 1.75 (SE = 0, *N* = 7), implying lack of proper provisioning of food.

Reproduction

Except Anarkali (30 years), none of the female elephants was in oestrus cycles. The male elephant, Lucky Prasad, was exhibiting 'musth'. None of the elephants was allowed to mate, the exception being Anarkali which had given birth to Ganga in 2001. The rating is designed to reflect animals in healthy reproductive condition. The low values for oestrus cycles imply poor reproductive health. Mean rating for cycling status was 1.67 (SE = 0.40, N = 6) with only one elephant, Anarkali (30 years), said to be cycling even though the mean age of the elephants was 18.2 years (SE = 0.61, N = 6).

Reproductive status has been adversely linked to chronic or intermittent stress (Moberg, 1985) [††] and social suppression within the elephant group (Abbott, 1989) †. The lone female which was cycling, Anarkali, had given birth to one calf named Ganga, which is also working in the circus. However, there are no documents to support the claim. After this birth, no birth has been reported from any of the elephants, including Anarkali. The lone male elephant, Lucky Prasad (40 years), was said to exhibit signs of 'musth' without showing any behavioural problems during this period. However, it did not have any opportunity for mating.

Health

There are no records of the health status of the animals, even though samples of the animals' blood have been tested. A local veterinary doctor was treating the animals when the need arose. Based on observations, nail crack of the right front leg of Anarkali and blindness in the right eye of Ganga was recorded.

Mean rating for availability of doctor was 10 (SE = 0, N = 7). All the elephants seem have access to a veterinary doctor who attended on all the elephants. The doctor seems to

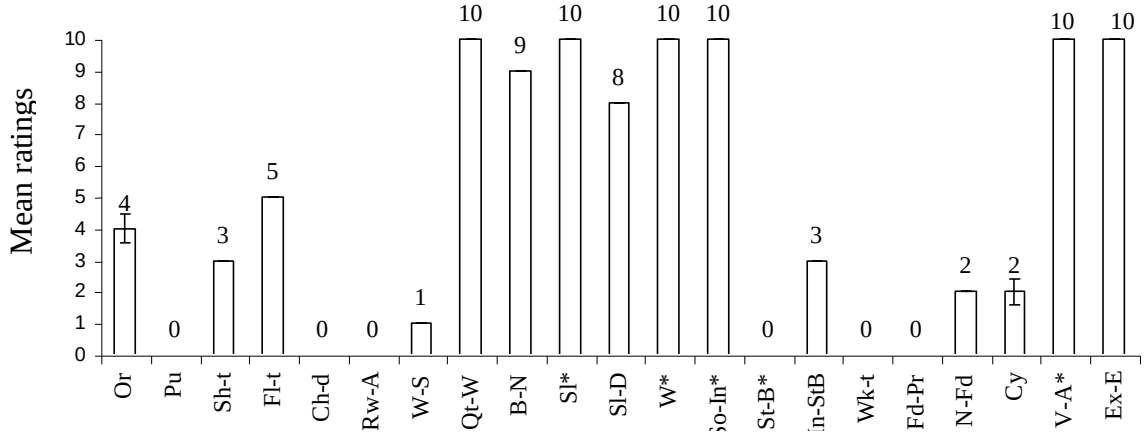
have had experience in treating elephants; thus, rating was 10 (SE=0, N=7). Physiological tests on the blood were done. However, the previous year's records were not available. The youngest elephant in the circus, Ganga (female, 7 years), was blind in her right eye. Records were not available regarding the cause of the blindness.

Blindness, in the absence of a hereditary cause, can be due to:

- •Striking with ankush around the eye/eyebrows (Phuangkum *et al*., 2005, Cheeran, 1997)
- •Exposure to high temperatures without any shade.

Overall rating pattern

Seven parameters (out of 22) have ratings above 9. However, parameters such as purpose of keeping, chaining duration, running water availability, stereotypic behaviour, work type, and the provision of food, have zero rating values (Figure 3). Parameters such as water source, number of food items, and status of cycling have ratings below 2.



Indicates Yes No type parameter with only two scores: 10/0

Or: Origin of elephant
Pu: Purpose of keeping
Sh-t: Shelter type
Fl-t: Floor type
Ch-D: Chaining duration
Rw-A: Running water availability
W-S: Water source
Qt-W: Quantity of drinking water
B-N: Number of times bathing
Sl: Sleep availability
Sl-D: Sleep duration
W: Walk
So-In: Social interaction
St-B: Stereotypic behaviour
In-StB: Intensity of stereotypic behaviour
Wk-t: Work type
Fd-Pr: Food provisioning type
N-Fd: No. of food items
Cy: Cycling status
V-A: Veterinary doctor availability
Ex-E: Experience with elephants

Figure 3: Ratings for Jumbo Circus elephants

Percentage occurrence of ratings provides interesting insights, as both 0 and 10 values contributing 29% (Figure 4). However, the bad-to-poor ratings, 5 to 1, contribute 32% and the better and best values 6 to 9 only 9.6%.

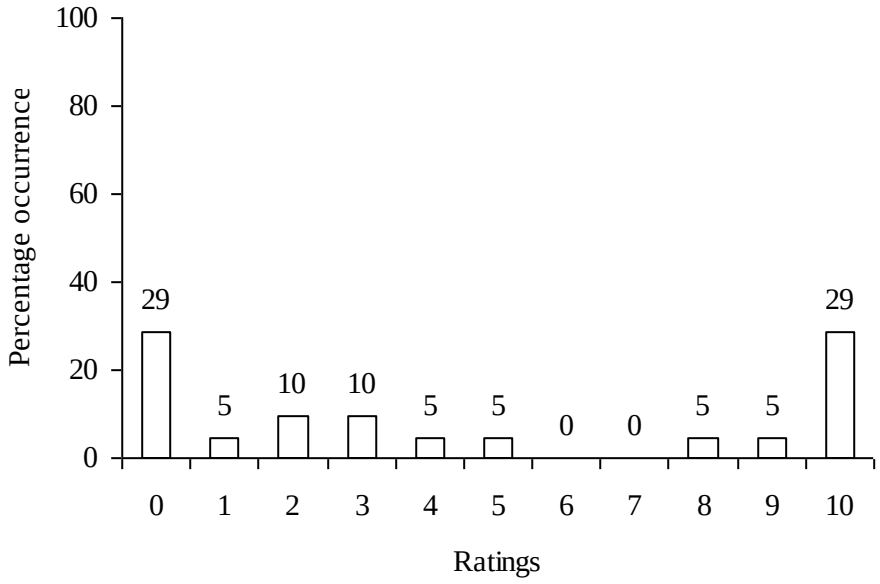


Figure 4: Percentage occurrence of ratings for circus elephants

Socio-economic status of the mahout

The circus had eight handlers to manage the elephants, their ages ranging from 18 to 30 years.

a. Education: None of the mahouts had attended school, mean rating was 0 (SE = 0, N = 8). Literacy helps to achieve better living standards and raises awareness of one's rights. In the context of the animal's welfare, being literate helps handlers to follow prescriptions to the animal in the event of illness.

b. Wages: The mahouts were paid in the range of Rs.3000 to 5500. This is exclusive of accommodation, food, and medical expenditure. This feature is given a rating of 10.0 (SE = 0, N = 8).

c. Insurance: Mean rating for insurance coverage is 10.0 (SE = 0, N = 8) implying availability of insurance cover to the handlers.

d. Health: Mean rating for regular medical check-ups of the mahouts was 0.0 (SE = 0, N = 8) as they were not being examined periodically by doctors. Regular check-ups are important in the context of transfer of diseases between humans and animals. Mahouts often transfer tuberculosis to the elephants (Cheeran, 1997). Employees handling elephants are required to be tested for tuberculosis according to guidelines issued by the US-based National Tuberculosis Working Group for Zoo and Wildlife Species (2003).

Discussion

Scores between 0.0 and 2.4 constitute worst living conditions, and 2.5 and 4.9 imply poor conditions. Overall mean rating when considered across individual elephants for each parameter was 4.9 implying poor welfare conditions for the elephants.

Forty-three per cent of the ratings were in the category of "bad" condition, whereas 14% were between 2.5 and 4.9. Scores of 7.5 and 10, for the elephants, constituted only 33% of all the scores. Of this, 57% of scores derived from the "Yes No" category do not highlight details of that particular feature being rated.

A significant feature of this circus is the prevalence of uniform conditions for all the elephants. When this is viewed in the context of the low rating given to most of the observed parameters, corrective action becomes all the more important.

The shelter provided for all the elephants was minimal, with the animals being chained for more than 20 h each day under a 'shamiana'. Even though mud flooring was provided, accumulation of the animals' excreta in that spot led to unhygienic and slippery conditions. There was no access to running water; the potential for water contamination is high. Also, none of the elephants could bathe in a water-body large enough to immerse the animal and provide relief from heat or ectoparasites.

The elephants were made to walk in an environment that lacked space and/or variation in the substrates available for walking. Social interaction is a significant factor in maintaining the health and psychological well-being of an elephant, especially of the females. The group size in this circus was seven elephants with one adult male and six females (range 7 to 30 years). Among these, only two females were reportedly related---Anarakali (30 years) and her daughter Ganga (7 years). Poole *et al.* (1997)† report lack of any strong social bond among unrelated female elephants in an orphanage in Sri Lanka. Thus, an elephant's most significant nature as a social animal is inhibited by the presence of unnatural groups.

Garai (1992)† reported formation of special relationships between unrelated females in three zoos which was restricted to just two females rather than the entire group. The stereotypic behaviour in all the female elephants needs urgent corrective action from a welfare perspective.

Work type was unnatural to the elephants' natural behaviour. This can be a source of stress in two ways:

- Training the animal to perform might involve harsh methods.
- Animal well-being, in the form of psychological stress, may be due to the performance of repetitive, unchanging and unnatural acts.

Food was in the form of stall-feeding, without any opportunity for free-range browsing. Free-range feeding behaviour not only adds to the diet, but also provides a platform for the expression of natural behaviour among the group members. It also leads to natural and healthy exercise in search and preparation of food material such as stripping leaves, peeling bark off trees, dusting grass and a host of food-related activities.

The failure of oestrus cycles among adult females indicates serious health and welfare deviations. No elephant, except for Anarkali, has been allowed to mate (no proof available). This is also true for the single male in the group.

Health status of the elephants is rated based on the observations recorded by the circus. No records of any previous medical history of the animals are available despite the animals having access to a veterinary doctor. Noticeable aspects among the animals are blindness in the youngest member of the group (Ganga, 7 years) and nail cracks in Anarkali.

The poor state in the welfare of circus animals has been echoed by Bist *et al.* (2001) in their report: "The circus elephants are used to entertain the public. But they do not appear to have a promising future. Circus companies in India are constantly struggling for their economic survival and they have to face tremendous criticism from animal welfare activists for subjecting their animals, including elephants, to unnecessary pain and cruelty…."

Mahout's wages could support a family of three or four. Insurance cover is provided. However, the mahouts are all uneducated. No routine medical checks-ups are available to them. They do not wish their children to pursue their profession.

References

1. Clubb, R., and Mason, G. (2002). A review of the welfare of zoo elephants in Europe: A report commissioned by the RSPCA. Oxford, U.K., Animal Behaviour Research Group, Department of Zoology, University of Oxford.
2. Kane, J. D. L., Forthman, D., and Hancocks, D. (2005). Optimal Conditions for Captive Elephants: A Report, Coalition for Captive Elephant Well-Being.
3. Phuangkum, P., Lair, R. C., and Angkawanith, T. (2005). Elephant care manual for mahouts and camp managers. FAO and FIO.
4. †Kurt, F., and Hartl, G. B. (1995). Asian elephants (*Elephas maximas*) in captivity- a challenge for zoo biological research. Research and Captive Propagation. Finlander Verlag, Furth, 310---326.
5. †Garai, M.E. (1992). Special relationships between female Asian elephants (*Elephas maximus*) in zoological gardens. Ethology, **90** (3), 187---205.
6. †Kurt, F., and Garai, M. (2001). Stereotypies in captive Asian elephants---a symptom of social isolation. Abstracts, International Elephant and Rhino Research Symposium, Vienna, Austria, Schuling, Munster.
7. †Shoshani, J., and Eisenberg, J.F. (1982). *Elephas maximus*. Mammalian species., **182**, 1---8.
8. †Sivaganesan, N., and Johnsingh, A.J.T. (1995). Food resources crucial to the wild elephants in Mudumalai Wildlife Sanctuary, South India. A week with elephants: Proceedings of the International Seminar on the Conservation of Asian elephants. Daniel, J. C. and Datye, H. S., (Eds.) Bombay Natural History Society and Oxford University Press, Oxford, 405---423.

9. †Fowler, M. E. (2001). An overview of foot condition in Asian and African elephants. In: *The Elephant's Foot*, eds. Csuti, B., Sargent, E. L., and Bechert, U.S. 3-7. Ames, IA: Iowa State University Press.
10. †Brockett, R. C., Stoinski, T. S., Black, J., Markowitz, T., and Maple, T. (1999). Nocturnal behaviour in a group of unchained female African elephants. *Zoo Biology* **18**,101---109.
11. †Gruber, T. M., Friend,T. H., Gardner, J. M., Packard, J. M., Beaver, B., and Bushong, D. (2000). Variation in stereotypic behavior related to restraint in circus elephants. *Zoo Biology*, **19,** 209---221.
12. †Moberg, G. P. (1985). Influence of stress on reproductive measure of well-being. In *Animal Stress*, Moberg, G. P., ed. 245---268. Bethesda, M. D: American Physiological Society.
13. †Abbott, D. H. (1989). Social suppression of reproduction in primates. Comparative Socio-ecology: the behavioral ecology of humans and other mammals. Standon, V. and Foley, R. A. (eds.) Blackwell Scientific, Oxford, 285---304.
14. Cheeran, J. V. (1997). Section II. Health. In: *Practical Elephant Management: A handbook for mahouts*. Namboodiri, N. (ed.) Coimbatore, Elephant Welfare Association.
15. Anon (2003). Guidelines for the control of tuberculosis in elephants. The National Tuberculosis Working Group For Zoo & Wildlife Species. Available online: www.aphis.usda.gov/ac/ElephTBGuidelines2003.html or www.elephantcare.org
16. † Poole, T. B., Taylor, V. J., Fernando, S. B. U., Ratnasooriya, W. D., Ratnayeke, A., Lincoln, G., McNeilly, A., and Manatunga, A. M. V. R. (1997). Social behaviour and breeding physiology of a group of Asian elephants, *Elephas maximus*, at the Pinnawala Elephant Orphanage, Sri Lanka, International Zoo Yearbook, **35**, 297---310.
17. Bist, S. S., Cheeran, J. V., Choudhary, S., Barua, P., and Mishra, M. K. (2001). The domesticated Asian elephant in India. In: Giants On Our Hands. Proceedings of the International Workshop on the Domesticated Asian Elephant, Bangkok, Thailand, 129---148.
18. †: Original not seen

Project team

Field investigators

Mr Rajendra Hasbhavi, Mr Harish Bhat, Ms Shama Karkal, Ms Vydehi Kadur, Mr Daniel Sukumar, Ms Savitha Nagabhushan, Ms Deepika Prasad, Mr Karthik, Mr. Ramesh Belagere, Mr. G. Gurudutt, Ms. Beena N. and Mr Dilip Humcha,

Research team

Ms S. R. Sujata
Compassion Unlimited Plus Action (CUPA) Bangalore
and

Dr.Roshan K Vijendravarma
Post Doctoral Researcher, Department of Ecology and Evolution,
University of Lausanne, 1015-Lausanne
Switzerland

Editorial and Layout Support
Pooja Mitra, CUPA and V.Govinda

Adviser

Prof. R. Sukumar
Centre for Ecological Sciences, Indian Institute of Science, Bangalore 560 012

Co-Investigators

Mrs Suparna Baksi-Ganguly and Dr Shiela Rao
Compassion Unlimited Plus Action (CUPA),
Veterinary College Campus, Hebbal, Bangalore 560 024 &
Wildlife Rescue & Rehabilitation Centre (WRRC),
Bannerghatta Biological Park,
Bangalore 560083

Principal Investigator

Mr. Surendra Varma
Asian Elephant Research & Conservation Centre
(A Division of Asian Nature Conservation Foundation (ANCF)), Innovation Centre,
Indian Institute of Science, Bangalore 560 012, India

Karnataka Forest Department was born on 11.1.1864 with a complement of five officers. The main aim of the department is to protect, conserve and promote sustainable development of the forests of the State and to promote tree based farming in support of soil and water conservation on agricultural lands. The department protects the forests and wildlife from various types of pressures and threats. The main protection activities include fire protection, boundary consolidation, prevention and removal of encroachment from the forest area, prevention of illicit cutting of timber and firewood, indiscriminate harvest of non timber forest produce, prevention of poaching of wild animals etc. The Department undertakes regeneration, soil and moisture conservation works, canopy manipulation, weeding, climber cutting habitat improvement, wildlife management etc., the department aims at increasing the productivity of the forests to meet the growing demands of the people. The afforestation is done on degraded forest lands, community lands, C & D class lands, fore-shore areas and other institutional lands.

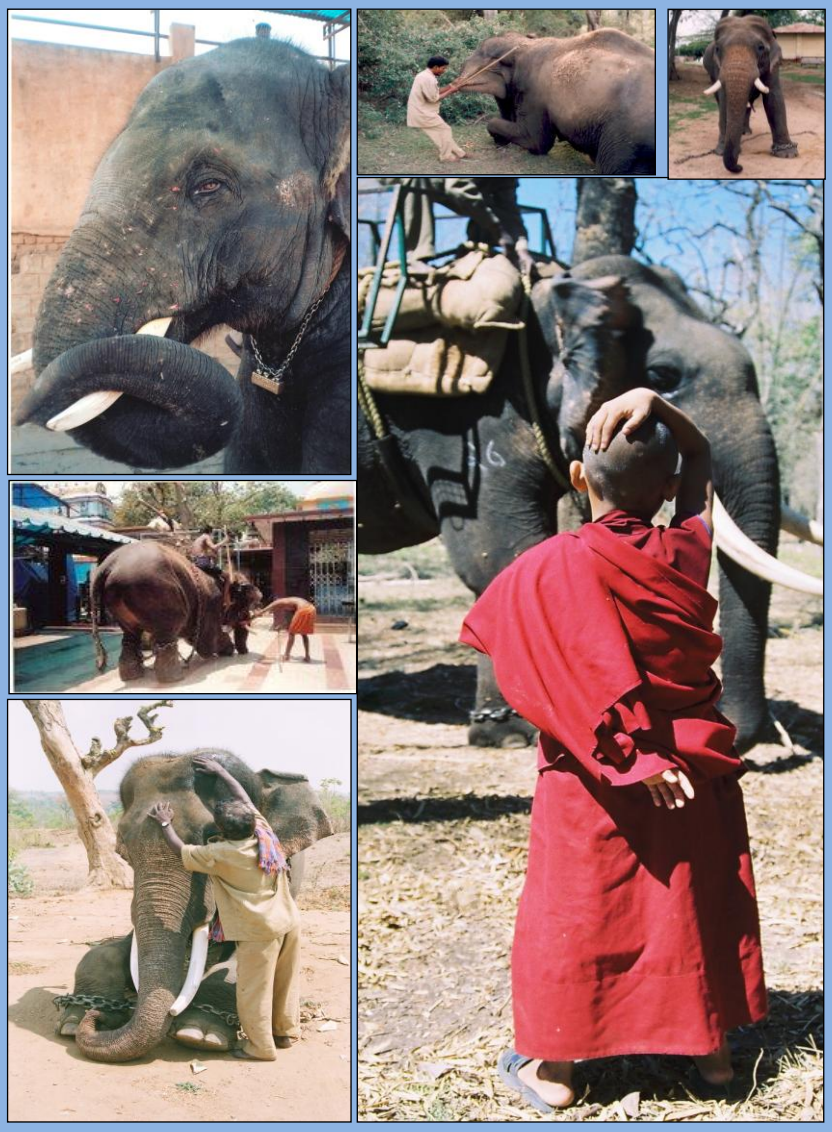
Compassion Unlimited Plus Action (CUPA) is a non-profit public charitable trust registered in 1991 that works for the welfare of all animals. Since 1994, CUPA has worked in close collaboration with government departments and agencies on various projects. CUPA's mission is to protect animals from abuse and violence and do what may be required to alleviate their suffering at the hands of humans. CUPA does not differentiate among pet, stray or wild animals, since all of them require assistance and relief from cruelty, neglect and harm. The organisation's objective has been to design services and facilities which are employed fully in the realisation of these goals.

Wildlife Rescue and Rehabilitation Centre (WRRC) is a registered public charitable trust for the welfare of wild animals and birds that often find themselves trapped in an urban environment. The Trust is a sister in concern of CUPA and both organisations complement each other in their services. WRRC was established as a separate Trust in 1999.

Asian Nature Conservation Foundation (ANCF) is a non-profit public charitable trust set up to meet the need for an informed decision-making framework to stem the rapidly declining natural landscape and biological diversity of India and other countries of tropical Asia. The Foundation undertakes activities independently and in coordination with governmental agencies, research institutions, conservation NGOs and individuals from India and abroad, in all matters relating to conservation of natural resources and biodiversity, endangered flora and fauna, wildlife habitats and environment including forests and wetlands. It participates and disseminates the information procured, knowledge and inferences in professional, academic and public flora.

World Society for Protection of Animals (WSPA) With consultative status at the United Nations and the Council of Europe, WSPA is the world's largest alliance of animal welfare societies, forming a network with 910 member organisations in 153 countries. WSPA brings together people and organisations throughout the world to challenge global animal welfare issues. It has 13 offices and thousands of supporters worldwide.

Photo Credits: Front cover & back cover (clock wise), a, b, c d, Figure 1a,
c,8a,12a,14b,17,a,b,c,d,19a, and b, 24a, b, 25a and b: Surendra Varma,
1b, 6a,b,c,d,12b,c,d,14a,19c,d: Rajendra Hasbhavi, Back cover (clock wise), e,f,8b,14c,14d: Savitha Nagabhushan,
1d: Gauis Willson.



The state of Karnataka has nurtured captive elephants for several centuries. It has provided a variety of facilities and several management systems have evolved in the process— forest camps, zoo, circus, temple and private individuals based on ownership. The conditions for elephants in captivity are quite different from those available in the wild. This deviation has been used in comparison with their current status to suggest any remedial measures to improve their well-being. One hundred and fifty three elephants were examined and their conditions and welfare status have been assessed through this document.

ISBN 978-81-910465-1-9
9 788191 046519

Karnataka Forest Department

Compassion Unlimited Plus Action

WRRC WILDLIFE RESCUE AND REHABILITATION CENTRE

ANCF ASIAN NATURE CONSERVATION FOUNDATION www.asiannature.org

WSPA World Society for the Protection of Animals