

Documenting Indigenous Traditional Knowledge of
the Asian Elephant in Captivity



Final Report
[February 2014]



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Preface

Elephants have been in captivity for nearly 3500 years now and recent estimates suggest that, globally, 15000 Asian elephants live in captive conditions. These elephants are housed in zoos, circuses, temples, government run elephant-camps/orphanages and with private owners, each with a unique management practice. Traditionally, in India, elephants have been captured and trained by a few tribes with an in-depth understanding of the behavior and ecology of the animal. In this study, we document the current status of elephant keepers and captive elephants in the forest elephant camps, highlight the importance of preserving the traditional knowledge and culture of elephant keeping and ways to strengthen the same by infusing nuanced scientific techniques of elephant management, and explore aspects of human-animal relationships, in this case, the relation between the elephant and its keeper.



Acknowledgements

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Abstract

Background: In the Indian Subcontinent, elephants have been managed and cared-for in captivity for over 3500 years. Along with this ancient tradition of elephant keeping comes in-depth knowledge and understanding of elephants. Preserving this knowledge is important for the welfare of both the elephant and its keeper. In this study we document the status of this traditional knowledge among the present day elephant keepers and the current elephant keeping practices in order to improve the welfare of elephants in captivity.

Methods: This study was carried out in five forest elephant camps in the state of Karnataka in Southern India for the duration of one year between January and December 2013. A questionnaire survey was used to document the current knowledge of the elephant keepers (N=92). Elephant-keeper interaction was assessed using focal animal and scan sampling between 75 individual elephants and 112 keepers.

Conclusions/Significance: The elephant keepers belonged to two groups, the indigenous forest tribes (70%) and the Muslims of East Bengal and of Mysore origin. Nearly 98% of all keepers today have their lineage associated with elephant-keeping but with no formal training in the same. On an average, a keeper has 15 years of work experience and has worked with ~3 elephants with a short turnover rate of 5 years/elephant. A majority of the keepers found their job to be respectable (95%), and yet dangerous (98%).

Given the current birth rates of elephants in captivity; the captive elephant population in the state will decline in the coming years. Personality tests of elephant keepers suggest that mahouts are less co-operative, sociable and fearful and more aggressive towards the elephant than the kavadis. Personality tests of elephants suggest that elephants are more co-operative, sociable, fearful and less aggressive towards their kavadis than the mahouts.

Management and welfare of elephants in captivity can be improved by simple but effective modifications in the daily routines of the individual elephants and their keepers. It is also very important, however, to provide formal training in this regard and take clear policy-level decisions to enforce these changes.

Introduction

The Asian elephant is among the mammals listed as “Endangered” in the IUCN Red List. The decline in its numbers in recent decades in certain parts of its range such as the Southeast Asian countries can be attributed to factors such as rapid loss and fragmentation of habitat, and illegal hunting and capture. Elephant-human conflicts are on the rise regionally. Ironically, this creature has had a love-hate relationship with people through the ages (Sukumar 2011). Historically, the capture of elephants and their use in war, as also for farming and forestry operations, have significantly contributed to their decline. Elephants are, at the same time, worshipped as gods in most part of its range but also feared as raiders and rogues by people living alongside them.

Elephants have been in captivity for more than 4000 years now and recent estimates suggest a global captive stock of 15000 Asian elephants (Kurt and Garai 2007), or about one-fourth of the total population of the species. India, with more than half the global wild Asian elephant population, is also home to approximately 3500 animals or 20-25% of the total captive elephant population. These captive elephants are housed in various establishments such as zoos, circuses, temples, government-run elephant-camps/orphanages, forest corporations and with private owners across the country, each with its distinctive management practice (Rangarajan *et al.* 2010). As one may imagine, they are put to use in more ways than one; as exhibits, as carriers of deity in festivals, in timber logging and also for capturing wild elephants.

Elephants, wild-caught or captive-born, need to be trained in order to be managed and to perform tasks. Traditionally, elephants have been captured and trained by a few tribes who have in-depth understanding of the behavior and ecology of the animal. This knowledge, gained over years by living and working with elephants, is passed onto kinfolk thus keeping this tradition alive. A recent trend, however, seems to suggest that this long-lived tradition is fast fading due to a number of reasons including younger members of these tribes being attracted to living conditions and lifestyles of an increasingly urbanized world and hence moving away in search of employment to towns and cities.

A number of very valuable texts, both historical and recent, are available on captive elephant management systems, elephant up-keep and on traditions of management. It is, however, seldom that one finds a text that scientifically explores different aspects of anthrozoology or human-animal relationships, involving, for example, (i) the relationship between the elephant and its keeper, (ii) the knowledge that these men have of their animals, in particular or the species, in general, and (iii) the corroboration of such knowledge of the keeper with the actual behavior and ecology of the specific individual elephant. An understanding on such aspects will definitely ensure a more comprehensive approach towards the management of elephants, not

only in captivity but also in the wild. In order to mitigate the ever increasing levels of human-elephant conflict, moreover, the knowledge that elephant keepers have of the strengths and weaknesses, likes and dislikes, needs and wants of the animals they take care of over the years will surely prove invaluable. In this study, therefore, I aimed ***to document and understand the nature of the traditional knowledge that indigenous elephant-keepers have of their elephants***. The main objectives of the study thus included:

1. To document the life of specific elephant-men and their elephants
2. To explore the nature of the mahout/kavadi-elephant relationship by observing their behavioral interactions

Methods

Study Site

This study was conducted in five forest elephant camps of the Karnataka State Forest Department (Appendix 1) from January to December 2013. The elephant camps, located along the Western Ghats, also home to Asia's largest wild elephant population, provided an ideal set-up to study and document the interactions between the mahouts and elephants. The five camps, put together, occupied a small area of approximately 5 km² within the protected area network. The elephants and their men, however, use the forest area around these camps extensively for their daily chores. Around 100 elephants and 200 elephant-keepers work in these camps and form a part of the workforce for the Forest Department. Elephants in these camps are managed by the State Forest Department. The hands-on management of each elephant is the responsibility of a minimum of two people, the Mahout and the Kavadi, mostly belonging to indigenous tribes and appointed by the Department (Varma *et al.* 2008).

Questionnaire Survey

The questionnaire survey was aimed to document the life of elephant-keepers (the mahout and kavadi) and their level of understanding of the behavioral, ecological and biological needs of the elephant. It included questions on their current occupation, work experience, indigenous knowledge and tradecraft, economic and social status, and their perception of elephants and their own work. It, further, had questions that dealt with their understanding of the elephant they were in charge of and of wild elephants in general (Appendix 2). The questionnaire also helped define various behavioral states of elephants, essential while carrying out personality tests for elephants and their keepers (Appendix 3).

Behavioral Observations

Direct observation of the interactions between the elephants and their keepers was carried out from 5 am to 7 pm while they performed their routine (daily) activities. Behavioral observations of each elephant was carried out on a daily basis using scan sampling while the behavioral responses of the elephants towards their keepers and *vice versa* were recorded using focal animal sampling of 10-min duration each on the subject pairs (Appendix 3). These behaviors, being context-specific, were broadly classified as positive and negative. Behaviors that help build confidence between the elephant and the keeper were classified as positive, e.g. rubbing, feeding, patting, talking, obeying commands, or playing. Behaviors that could potentially strain the relationship were classified as negative, e.g. beating, poking, shouting, charging, or adopting a threatening posture. Quantitative data, in terms of the frequency of each behavioral response, was collected during the sampling sessions (n=100 individual scans/1101 elephant

scans and 1000 min focal scan per individual). These behavioral responses were in the form of tactile, vocal, olfactory and visual communication. Personality tests using multiple observers (N=5) were carried out on 22 mahouts and kavadis, and 11 elephants in order to assess the current working relationship between them.

Keeper Effort

Good Elephant-Keeping Practices (GEKP) is essential for an elephant camp to function efficiently. These practices can help improve the welfare of the elephant and its keeper. Such practices that are otherwise a routine in an elephant camp are often neglected. A list of such activities was prepared in consultation with experienced mahouts (>20 years of experience) and by observing their interaction with the elephants on a daily basis. A total of 66 such activities were identified and documented. Mahouts and kavadis from different backgrounds and with varying years of work experience were ranked on the basis of regular execution of each of the 66 activities. Each activity was scored on a scale of 1 (seldom practiced), 2 (often practiced) and 3 (always practiced). An elephant keeper who followed GEKP would obtain a maximum score of 198 and a keeper who did not would get a minimum score of 66.

Classifying elephants and mahouts

Elephants (N=11) were classified into three groups, namely E1, E2 and E3 on the basis of their personality using Jenks Natural Break classification (Table 1). For this purpose, having noted that both positive and negative behaviors form part of an elephant's behavioral repertoire, a ratio of positive to negative behaviors displayed was calculated. The higher the ratio the better was the elephant and was classified under E3, and lower the ratio the more difficult it was to manage the elephant and therefore classified under E1. The average score of elephant using this method was 3.05 with the minimum score of 1.83 and a maximum score of 4.29.

Mahouts and Kavadis (N=22) were also classified into three groups, namely K1, K2 and K3 on the basis of a cumulative score of their GEKP and Personality Test scores (PT) using Jenks Natural Break classification (Table 2). For this purpose, having noted that positive and negative (necessary evils) behaviors form a part of a keepers behavioral repertoire, a ratio of the positive and negative behaviors (cumulative of personality test and GEKP) displayed by them was calculated. The higher the ratio, the better was the keeper in GEKP and PT and was hence classified under K3, and lower the ratio, the keeper scored low in GEKP and PT and was therefore classified under K1. The average score of the keeper using this method was 12.06 with the minimum score of 8.87 and a maximum score of 17.50.

Table 1: Shows the categorization of elephants based on the personality test

	Personality Test Score	Number of elephants	Category
1	1.830 - 2.180	3	E1
2	2.180 - 3.240	4	E2
3	3.240 - 4.290	4	E3

Table 2: Shows the categorization of the elephant keepers based on the cumulative score from the personality test (PT) and good elephant keeping practices (GEKP)

	Cumulative Score	Number of keepers	Category
1	8.870 - 10.070	3	K1
2	10.070 - 13.630	11	K2
3	13.630 - 17.500	6	K3

Results and Discussion

At the general elephant camp-level

A total of 92 elephant keepers belonging to two ethnic groups, the indigenous forest tribes and the Muslims of East Bengal and Mysore origin (Fig 1) were interviewed for this survey. A majority of the keepers, however, were forest tribes (70.33%).

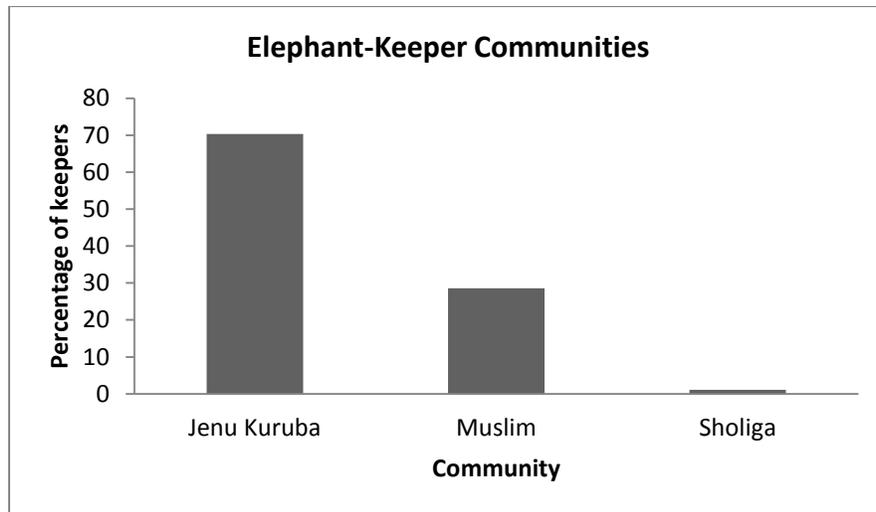


Figure 1: The ethnic communities to which the elephant keepers belonged in the study forest elephant camps

Among the tribes, 98.45% belonged to the Jenu Kuruba community and the rest to the Sholiga community. Nearly 95% of all keepers today have their lineage associated with elephant-keeping over at least two generations (Fig 2).

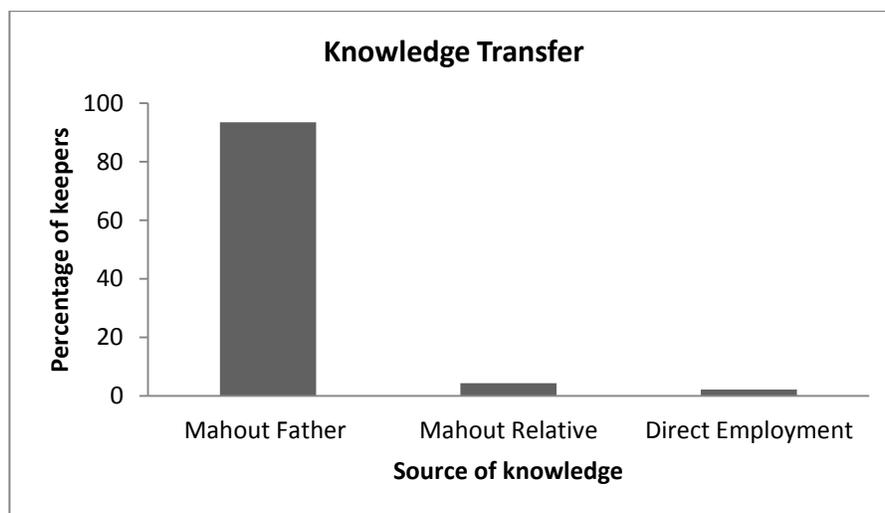


Figure 2: The source of knowledge of elephants possessed by the keepers of today. The total number of respondents, N = 92.

Although a majority of the elephant keepers have a lineage in elephant keeping harking back at least two generations, only 65% of them have worked on elephants along with their relatives from their childhood, thus learning this craft (Fig 3). Nearly 35% of the present-day elephant keepers have tried other professions including working as daily wage labourers in the coffee estates abutting forests. Only 10% of them have had any formal education in high schools or have graduated from them.

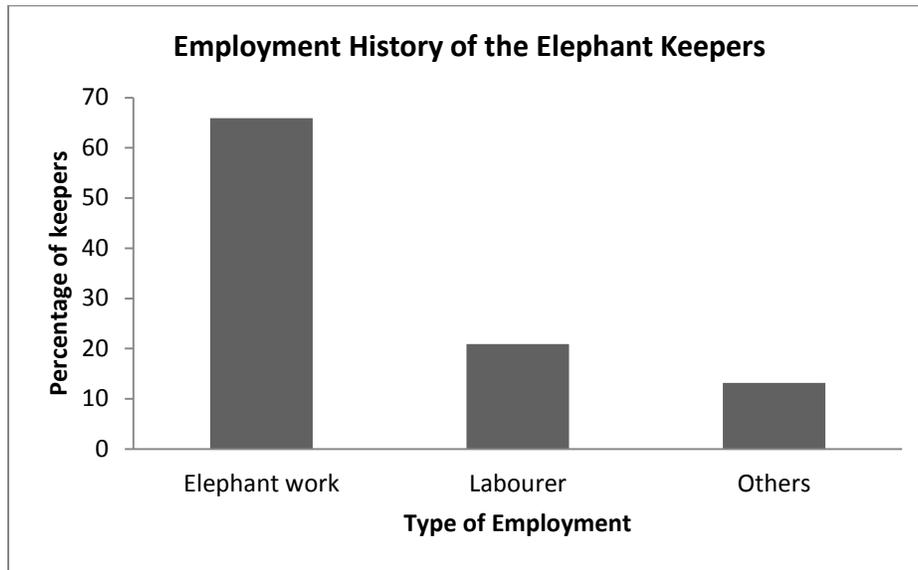


Figure 3: The employment history of the present-day elephant keepers. The X-axis represents the type of work the keepers were involved in before becoming a mahout or kavadi. The total number of respondents, N = 92.

The average age of the keeper was 35 years, with an average work experience of 14 years. Each mahout had worked with at least three elephants in his lifetime, with a short turnover rate of less than 5 years/elephant. The mahouts clearly pointed out that they require at least three years to understand an elephant fully and another 5 years to build up trust with the animal. All the keepers were of the opinion that changing from one elephant to another is generally a “bad” practice and a “dangerous” one for them and for the elephants, and that this should not be practiced. Nearly 95% of the keepers found their job to be respectable and were happy that they were distinguished within their own communities as elephant keepers as opposed to being an ordinary tribesman. Nearly 98% of the keepers observed their job to be life-threatening. The keepers identified the threat to be highest from wild animals in the forest that they live in, especially bears and wild elephants. Nearly 20% of the keepers felt threatened by their own elephants while virtually all the keepers opined that elephants were unpredictable (Fig 4).

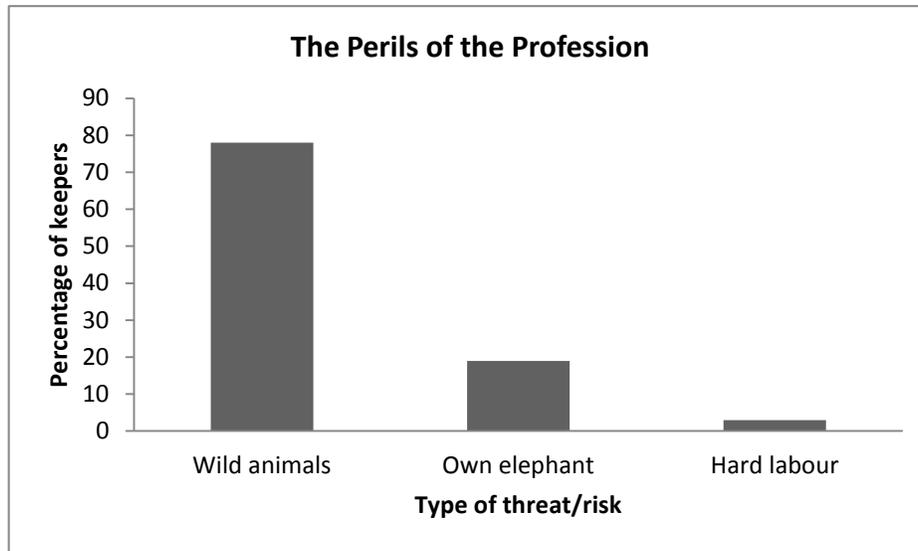


Figure 4: The perceived dangers of the profession to the elephant keepers. The total number of respondents, N=92.

Although nearly all the respondents considered their job to be hazardous, they claimed that they were attracted to it primarily because of three reasons: a liking for elephants, the advantages of government employment, and potential unemployment (as they did not find any other job or did not have any other skill). It is noteworthy that keepers who had obtained a high school degree or studied beyond clearly did not want their wards to take up this profession, unless they insisted on it. This was more evident among the keepers of the Muslim community, who were better educated than the tribes. It is significant that approximately 98% of the keepers from the Muslim community said that they did not want their children to take up elephant keeping in stark contrast to 98% of the tribal keepers who said that they wanted their children to follow in their footsteps. The knowledge and understanding of this craft and elephants that the keepers possess were significantly positively correlated to their experience (years as elephant-keeper) and origin (lineage).

Nearly 99% of the keepers said that they had learnt this craft by observing their fathers and relatives doing elephant work and had not received any formal training in elephant keeping and management. All the keepers (n=92) said that they wanted to learn more and would want to be trained by experienced mahouts and elephant keepers, and were open to learning nuanced techniques of elephant keeping.

The elephant keepers were adept in reading the subtle variations in elephant behavior (Appendix 2), in assessing their physiological state and health status, and highly knowledgeable regarding their ecology. They identified about 10 species of seasonally preferred elephant-fodder plants and nearly four species of indigenous medicinal plants used by them to treat ailments in elephants; these medicinal plants were also preferred by the elephants themselves

when ill or in a certain physiological state termed 'musth'. Their general knowledge was, however, limited to their elephants and that of elephants in the forests they work in. It was also evident that they are not able to spread this knowledge to the general public in any way or showcase the same in various forums. It should also be noted that although only 20% of the mahouts admitted that alcohol consumption was a "bad habit", almost all of them drank to different degrees.

A total of 75 elephants belonging to the two sexes (Fig 5) and four age classes (Fig 6) were observed during the study period. Males dominated the captive elephant population in direct contrast to what is observed in wild populations. The adult age class was also dominant in this population with a long inter-calving interval of 9.5 years, as compared to wild populations from the same area with a birth rate of 0.1 calf/year (inter-calving interval of 4 to 5 years). A few of the breeding females, however, were in good condition, with inter-calving intervals of as low as 3 years. The majority of the adult females were above the age of 50 years and it is expected that very high levels of inbreeding might be the norm in these camps.

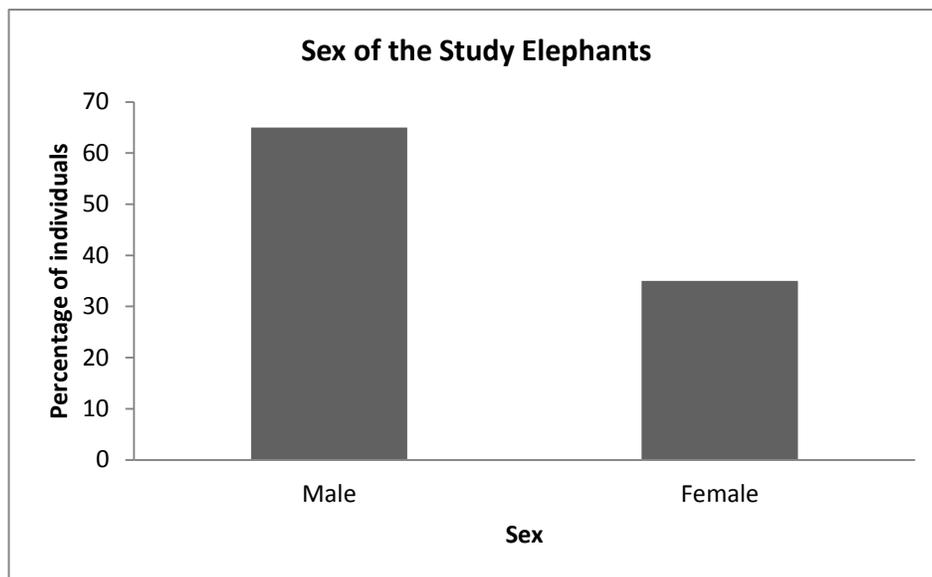


Figure 5: The sex of the elephants observed in the study camps. The total number of sampled elephants, N=75.

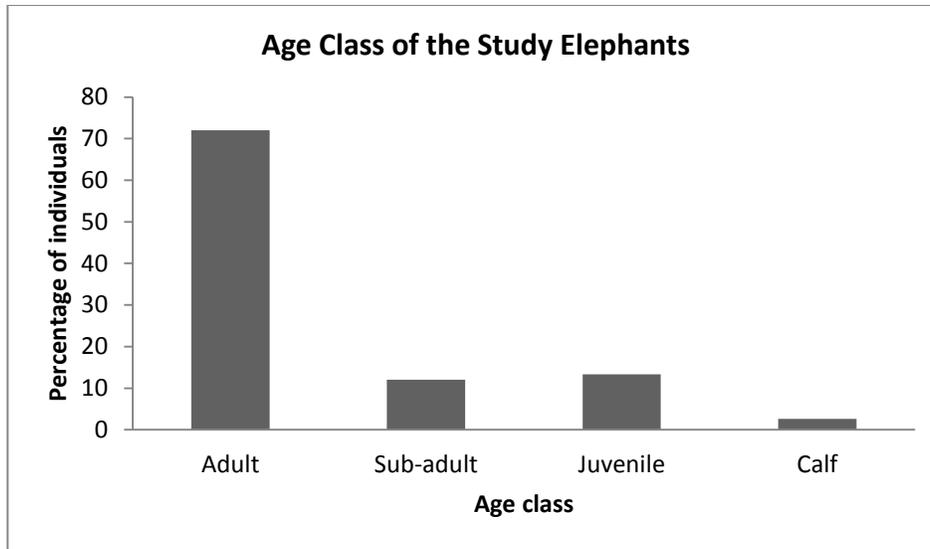


Figure 6: The age classification of the study elephants under study. Adult:>15 years, Sub-adult: 5 to 15 years, Juvenile: >1 and <5 years, and Calf:<1 year. The total number of sampled elephants, N = 75.

At present, 53% of all the captive elephants observed were wild caught while the remaining captive-born. At the current rate of breeding observed in the study camps, the captive elephant population in the state of Karnataka is likely to decline in the coming years.

The elephants in the camps were typically weaned around the age of 3 years and trained rigorously till the age of 10 years. The training was observed to continue well until the age of 40 years. The basic commands were, however, taught within 3 to 6 months of training. Wild-caught individuals, who are older (>10 years) were stated to learn relatively more quickly than did the younger individuals.

A keeper was required to carry out nearly 66 activities in order to take care of the elephant, on a daily basis (Appendix 4). This 'keeper effort', which correlated with the time spent with elephant, ranged from a minimum of 66 (66×1) to a maximum of 198 (66×3) on a scale of 1 (seldom) to 3 (always). On an average, a mahout spent less time with his elephant (~135) than did his kavadi (~165). The results of our personality tests of the elephant keepers suggest that mahouts are less cooperative, sociable and fearful, and more aggressive towards their elephants than were the kavadis. The personality tests of the study elephants also indicate that they were more cooperative, sociable, fearful and less aggressive towards their kavadis than towards the mahouts.

Personality Tests and Behavioral Observations

At a specific elephant camp-level

A comparison of the personality assessment of the elephants (n=11) and the keepers (n=22) by the five selected observers showed no significant variation among their scoring (Kruskal Wallis test was non-significant for most elephants except Raj and most keepers except Ram and Sal), thus validating the scoring method. Further analysis suggests that Raj, Ram and Sal are highly unpredictable and are thus classified under categories of E1 and K1 respectively.

Management practices and the personality of the elephant

The elephants were grouped into three categories E1, E2 and E3 based on the ratio of the positive and negative personality traits. Four elephants were ground under E2 category, three under E1 and the remaining four under the third category E3 (Fig 7). See appendix 5 for details on the age and sex of the individual elephants monitored for personality traits.

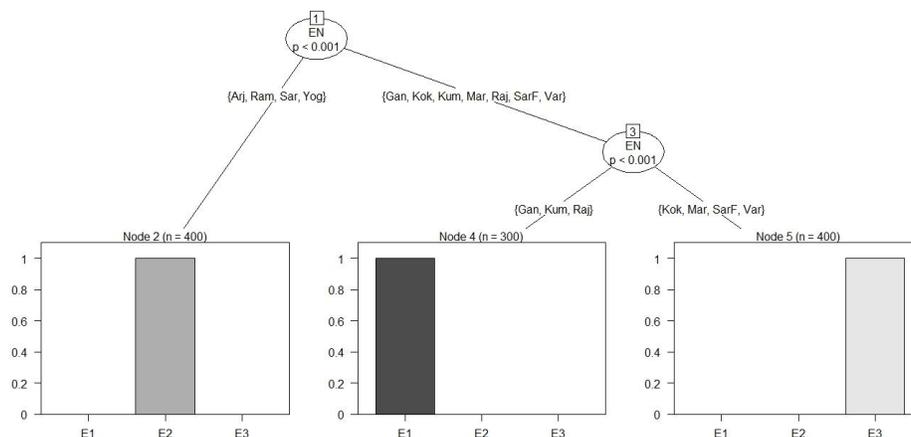


Fig 7: Classification of elephants into E1, E2 and E3 categories based on personality tests. E is the elephant category, EN is the elephant name

Age class and the positive, negative behaviors of elephants

Elephants in the subadult age class (5 to 15 years) in general displayed more negative behaviors than the adult animals (>15 years). The adult animals, however, showed a greater degree of variance in their behaviors (Fig 8 and 9). All the subadult animals belonged to the E2 category while the adults were distributed across the three categories (Fig 10). This is a reflection of the fact that the subadult animals are still under the training and learning period. Hence they display both the positive and negative behaviors almost equally. In the case of the adult animals that have been trained for a longer period than the subadults (except for those adults who are newly captured), the behaviors are set. The keepers believe that it is very difficult to predict the behavior of the elephant until it reaches the age of puberty (~10 years). Based on the personality test of the elephant by

keepers, elephants that showed a high level of aggression were identified. In order to verify this assessment by the observers, a classification tree was generated with elephant categories as the dependent variable and aggression as the independent variable (Fig 11). The results of the regression analysis clearly show that elephants with high levels of aggression are grouped under E1 category. Elephants with very low levels of aggression are grouped under E3 category.

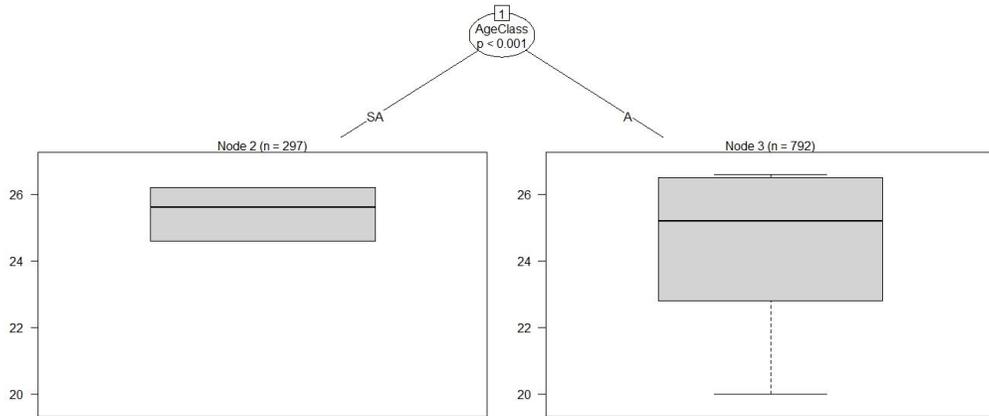


Fig 8: Positive behaviors displayed by the subadult (SA) and adult (A) individuals.

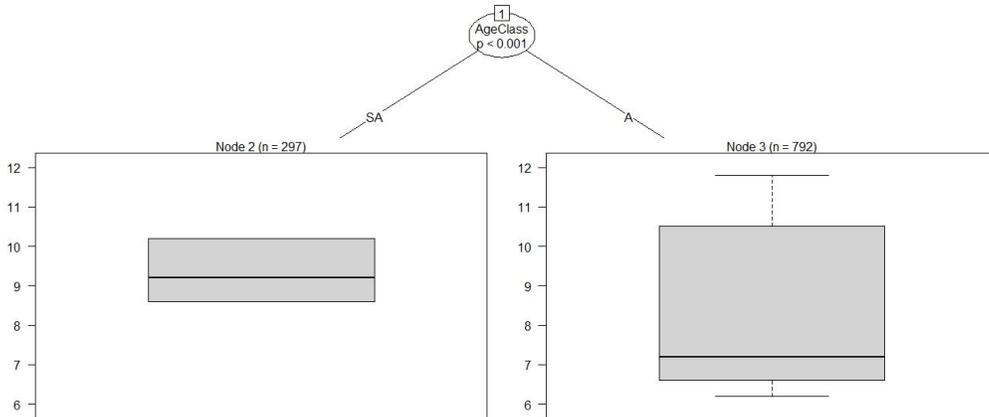


Fig 9: Negative behaviors displayed by the subadult (SA) and adult (A) individuals.

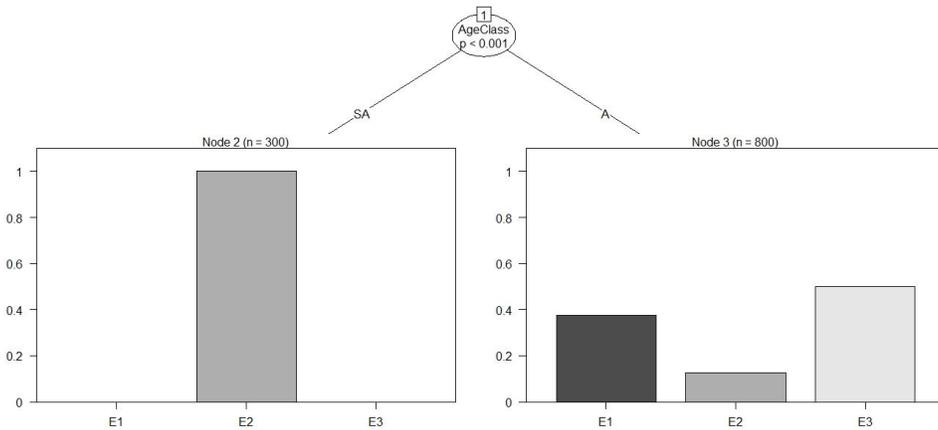


Fig 10: Ratio of positive and negative behaviors displayed by the subadult (SA) and adult (A) individuals.

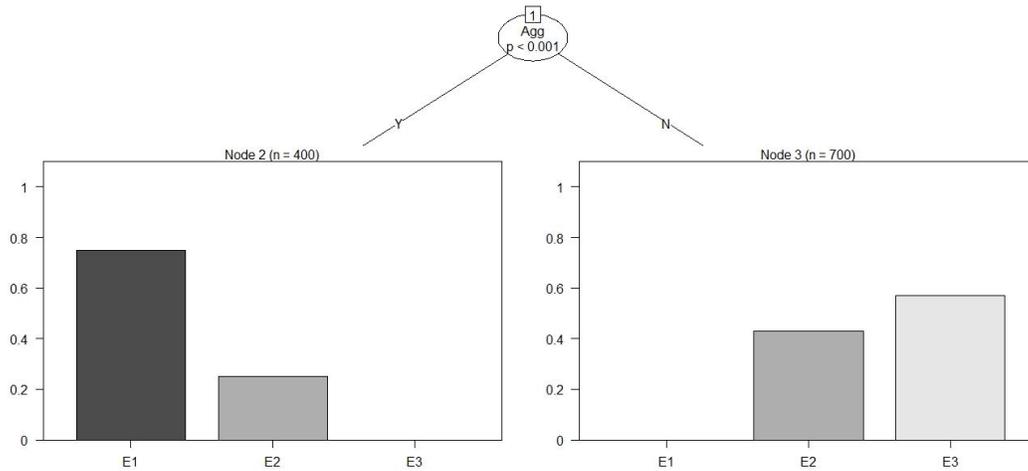


Fig 11: Classification of individual elephants that are known to be aggressive in nature. Aggression (Agg) , Yes (Y) and No (N).

Personality of Kavadi and the behavior of elephants

The classification tree shows clearly that elephants under the care of kavadis in the K3 and K2 categories display high levels of positive behaviors (Fig 12). While the elephants under the care of kavadis in the K1 category show very low levels of positive behavior and high levels of negative behavior (Fig 12 and 13). The propensity of an elephant falling under E1 category is highest under the care of the Kavadi in the K1 category. The propensity of an elephant falling under E3 category is highest under the care of the kavadi belonging to the K3 category. One must however note that the behavior of the elephants is not entirely dependent on the personality of the keeper, it is also dependent on the idiosyncratic behavior of the individual

elephant itself. This is clearly shown in the results wherein elephants belonging to all three categories are found under the care of K3 category kavadis.

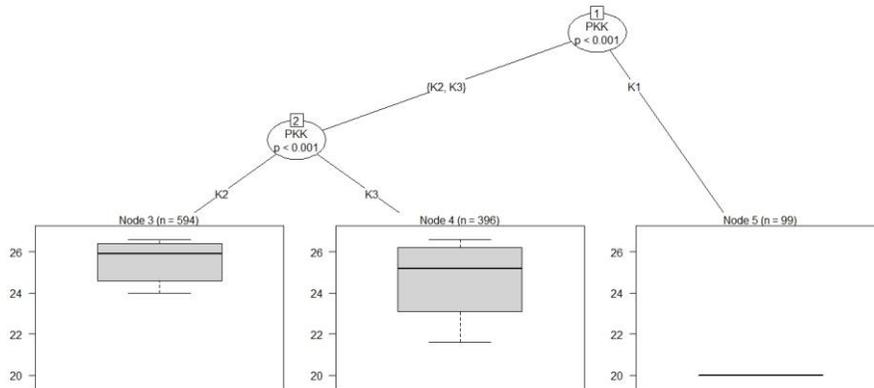


Fig 12: Positive behaviors displayed by elephants under the care of Kavadis. Personality of the Kavadi (PKK), Kepper category (K1, K2, K3)

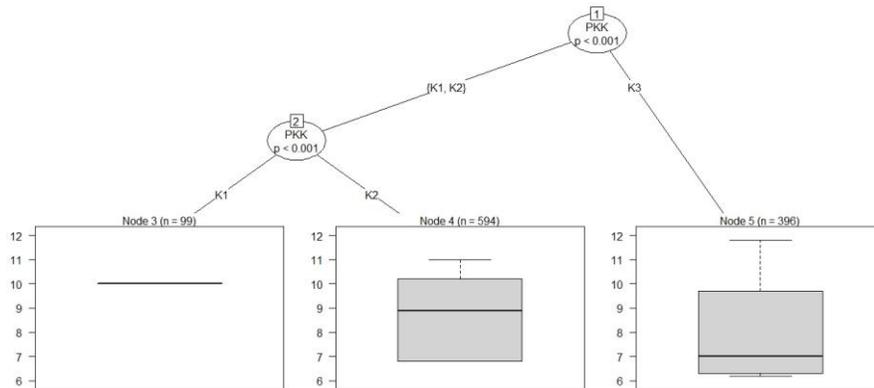


Fig 13: Negative behaviors displayed by elephants under the care of Kavadis. Personality of the Kavadi (PKK), Keeper category (K1, K2, K3).

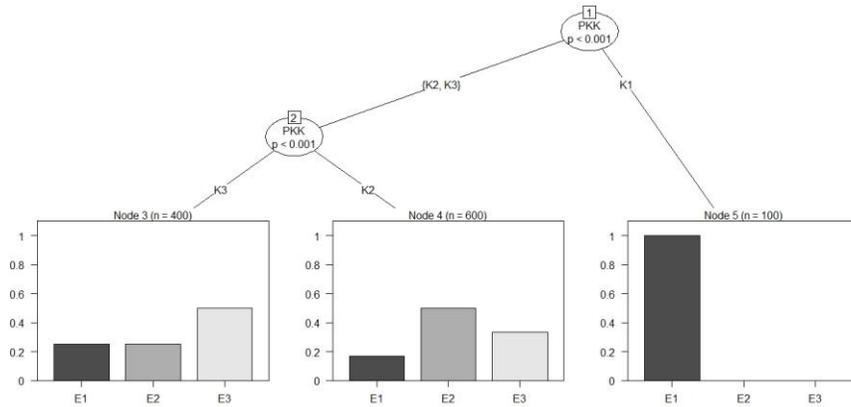


Fig 14: Ratio of positive and negative behaviors displayed by elephants under the care of Kavadis. Personality of the Kavadi (PKK) and Keeper category (K1,K2,K3).

Personality of Mahout and the behavior of elephants

Similar to the results obtained in the section above, the classification trees show clearly that elephants under the care of mahouts in the K3 and K2 categories display high levels of positive behaviors (Fig 15). While the elephants under the care of mahouts in the K1 category show very low levels of positive behavior and high levels of negative behavior (Fig 15 and 16). The propensity of an elephant falling under E1 category is highest under the care of the mahout in the K1 category. The propensity of an elephant falling under E3 category is the highest under the care of the mahout belonging to the K3 category (Fig 17).

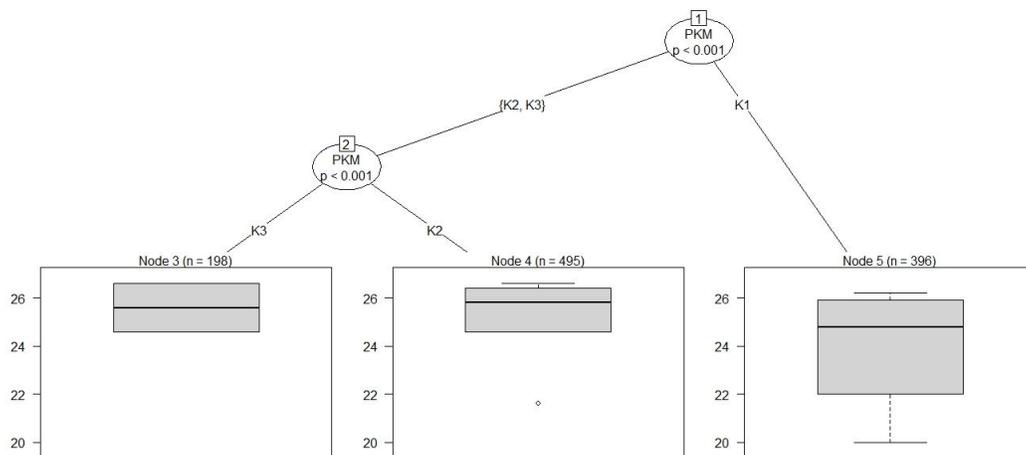


Fig 15: Positive behaviors displayed by elephants under the care of Mahouts. Personality of the mahout (PKM), Keeper category (K1, K2, K3)

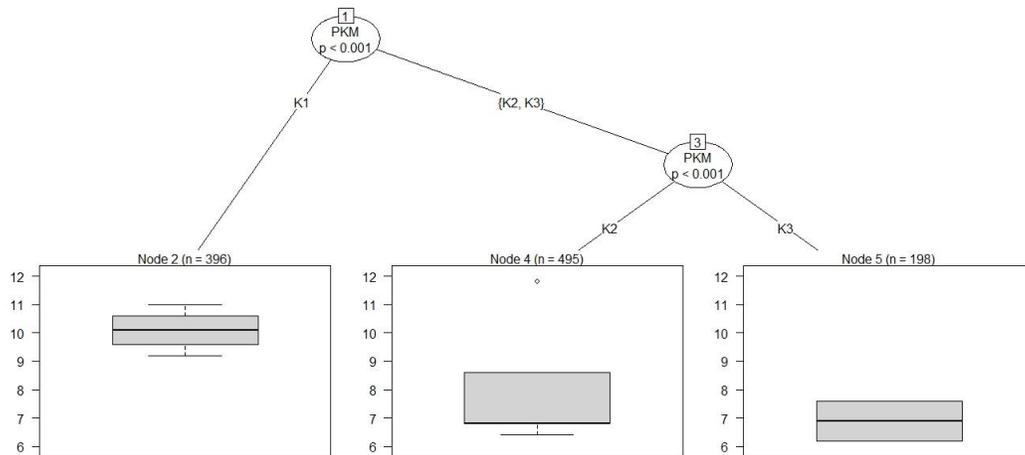


Fig 16: Negative behaviors displayed by elephants under the care of Mahouts. Personality of the mahout (PKM), Keeper category (K1, K2, K3)

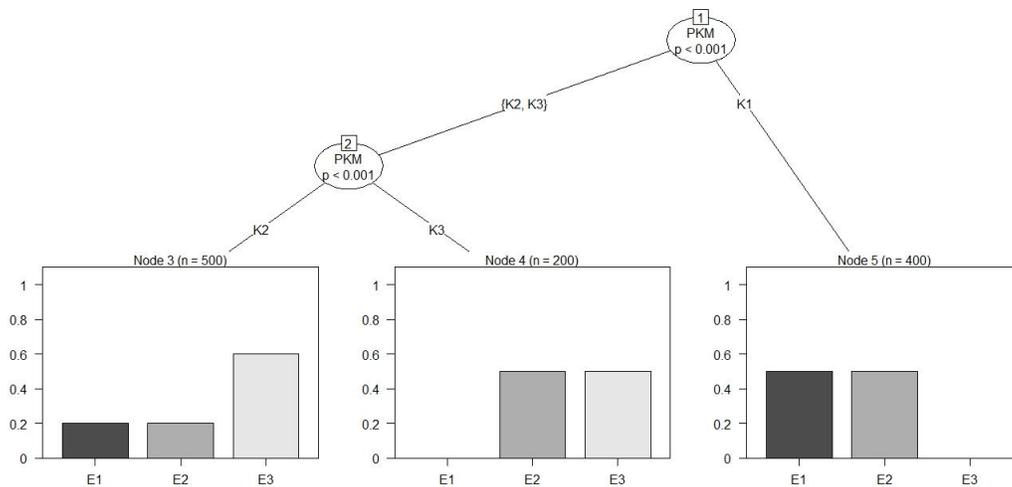


Fig 17: Ratio of positive and negative behaviors displayed by elephants under the care of Mahouts. Personality of the mahout (PKM) and Keeper category (K1, K2, K3).

Sex class and personality of elephants

Results of the study show that female elephants display more positive behaviors than males (Fig 18, 19). These findings only corroborate the common knowledge of the elephant keepers who consider female elephants to be more obedient and predictable than the males. It also helps us understand that females unlike males, who are mostly solitary in living, do fare better in the company of the keeper. It is important to note that male elephants do not come under the E3 category.

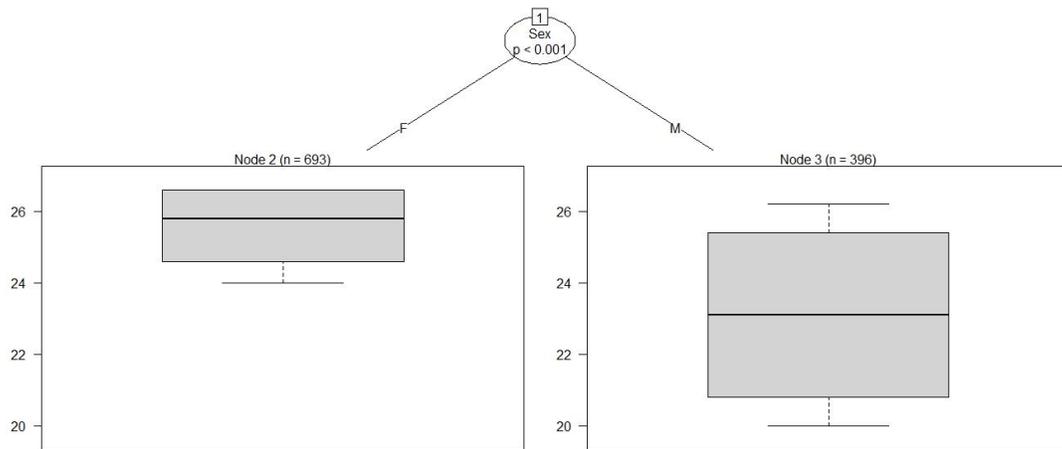


Fig 18: Positive behaviors displayed by the male (M) and female (F) elephants

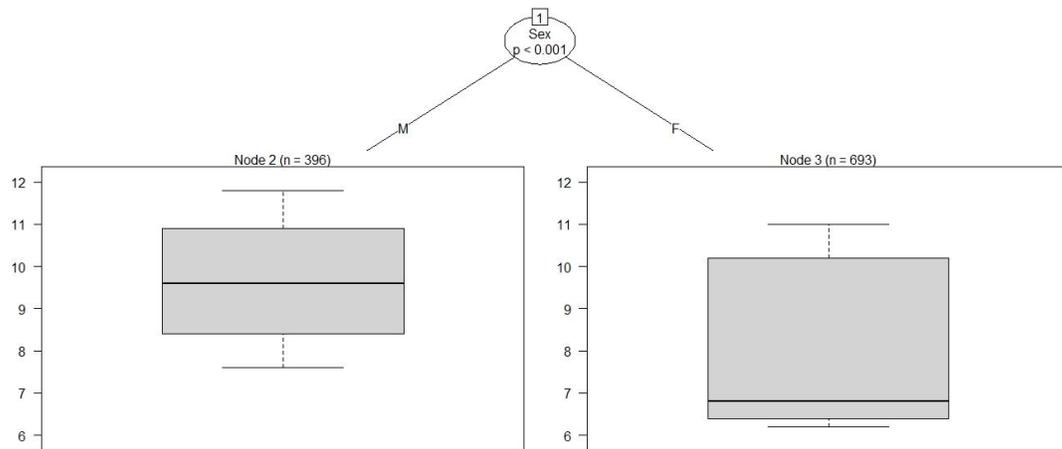


Fig 19: Negative behaviors displayed by the male (M) and female (F) elephants.

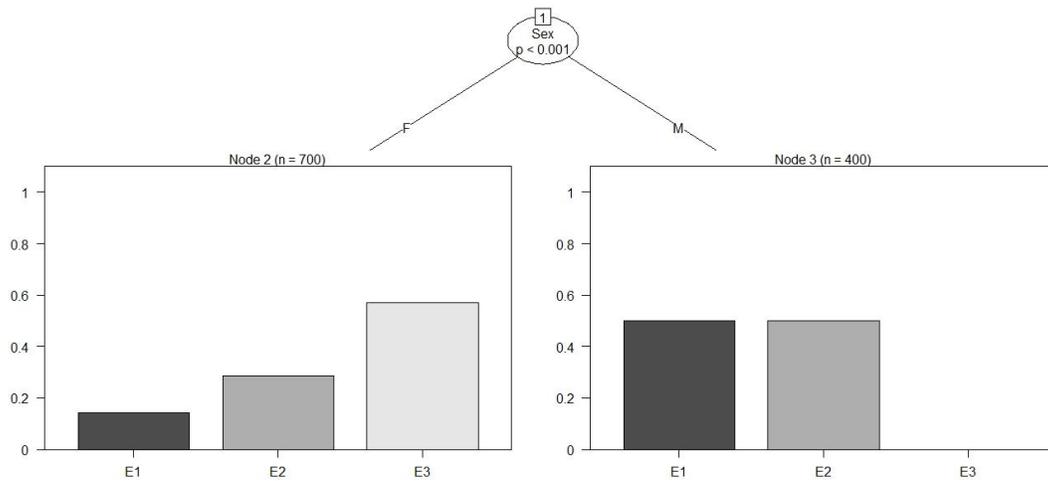


Fig 20: Ratio of the positive and negative behaviors displayed by the male (M) and female (F) elephants and categorization

Source and personality of elephants

On an average, elephants caught from the wild displayed a higher frequency of positive behaviors than elephants born in captivity (Fig 21, 22). There is, however, also a high variation in the behaviors displayed by the WC elephants from high positive to low positive and vice versa. It is important however to note that none of the captive-born elephants fall under the E3 category of elephant personality (Fig 23). This again corroborates the keeper’s observation that elephants caught from the wild are more obedient than the elephants born in captivity. They seem to believe that elephants born in captivity lose the fear of man and also learn all the tricks of the trade from the time they are born and hence are difficult to manage.

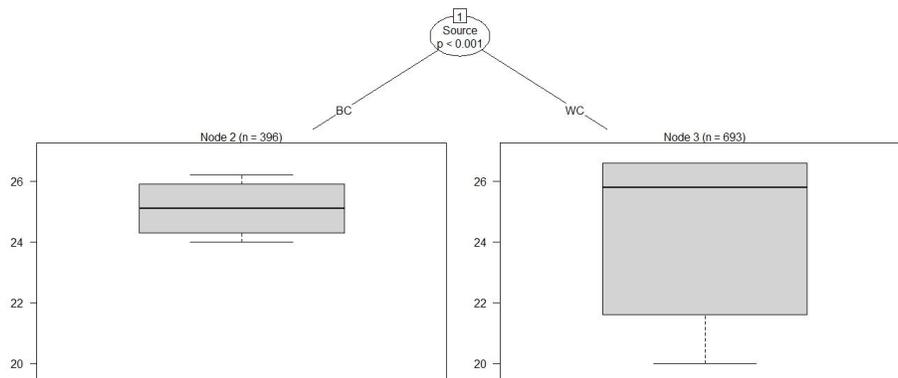


Fig 21: Positive behaviors displayed by elephants born in captivity (BC) and elephants caught from the wild (WC).

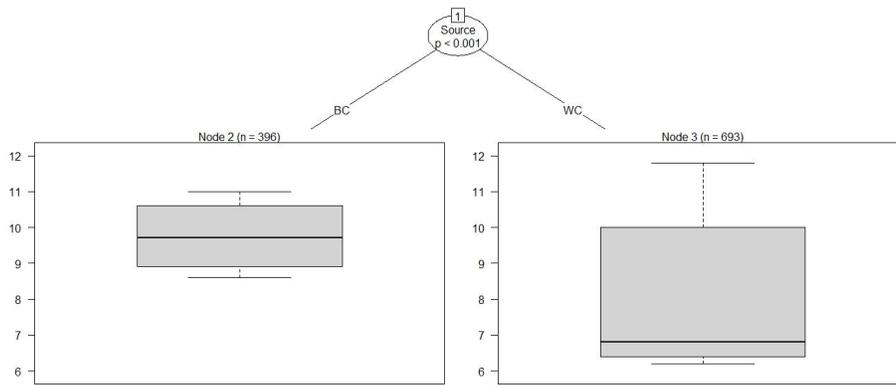


Fig 22: Negative behaviors displayed by elephants born in captivity (BC) and elephants caught from the wild (WC).

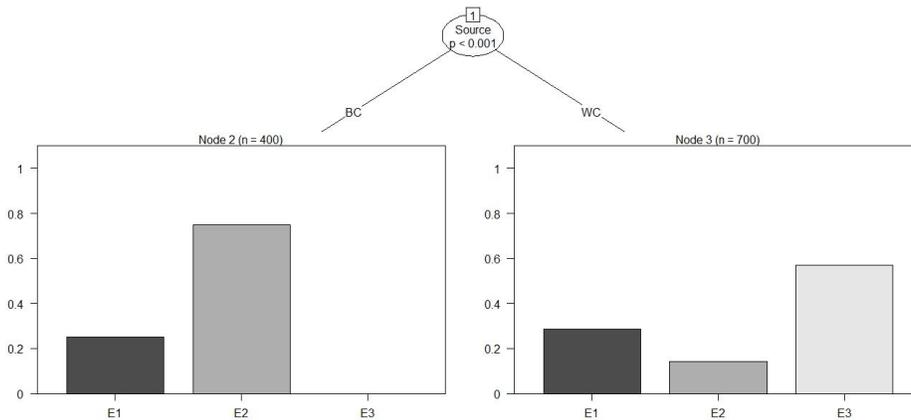


Fig 23: Ratio of positive and negative behaviors displayed by elephants born in captivity (BC) and elephants caught from the wild (WC).

Years in captivity and personality of elephants

The results of the study show that elephants with more than 40 years in captivity fall clearly under the category of E3 and those with less than 10 years in captivity are grouped under the E1 category. The questionnaire survey of the keeper’s suggests that the average number of years a keeper and his elephant takes to trust one another is 8 years. The results from the personality test seem to corroborate the interview survey and the knowledge of the keepers. Elephants between 10 and 40 years in captivity show a high variation in behaviors switching between positive and negative, making them more unpredictable.

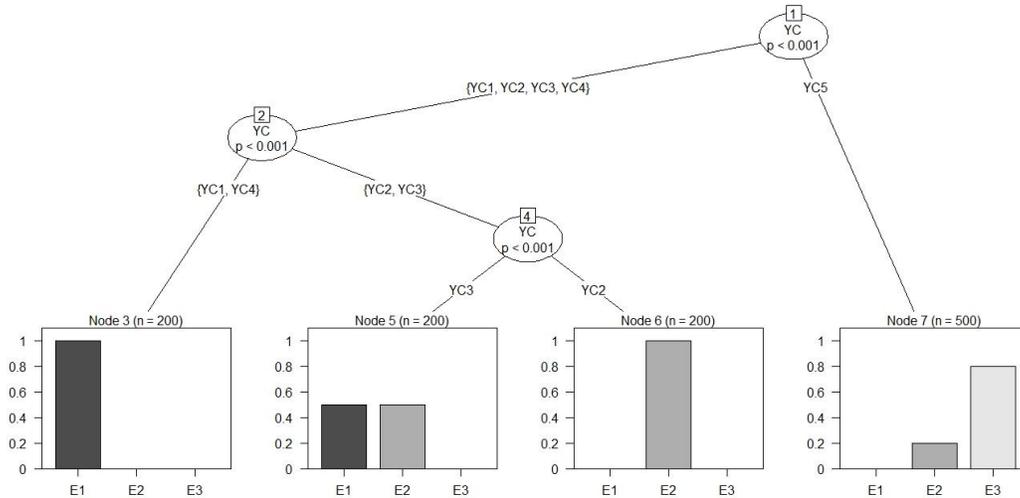


Fig 24: Ratio of positive and negative behaviors displayed by elephants in relation to the years in captivity (YC). YC1(0 to 10 years), YC2 (10 to 20 years), YC3 (20 to 30 years), YC4(30 to 40 years) and YC5(40 to 50 years).

Categorization of the elephant keeper

The results of the study show that keepers with the maximum number of years in the profession are classified under K3 category (Fig 25). These keepers are very few as most of them are old and are due for retirement. They also come from the traditional timber logging camps of the state forest department. The fact that elephants in the camps today have little or no work is reflected in their keepers taking to alcoholism and neglecting their elephants. It is also reflected in the personality of elephants as discussed before, the elephants becoming disobedient and unpredictable. It is this apathy towards the keepers and their apathy towards elephants that may be the key reason for conflict in elephant camps. See appendix 6 for keeper details.

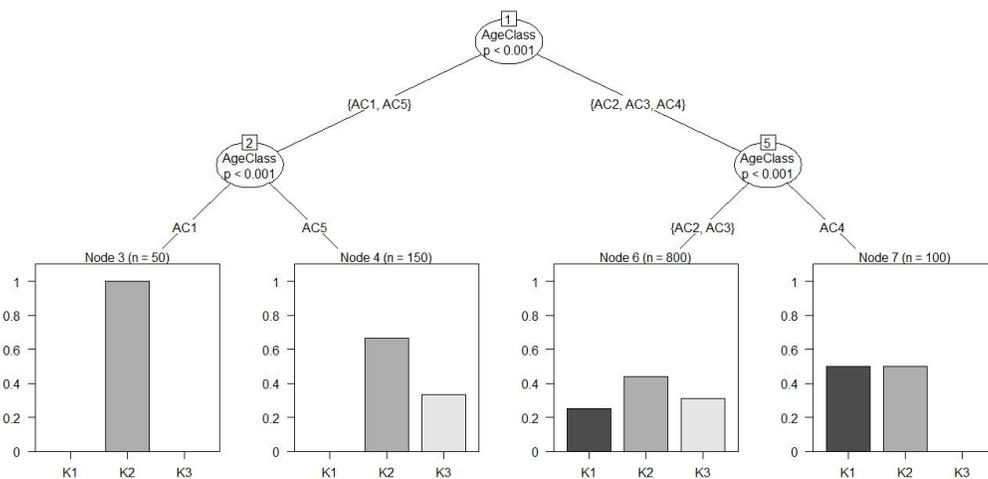


Fig 25: A cumulative ratio of positive and negative behaviors and GEKP displayed by keepers in relation to the years in profession (AC). AC1(0 to 5 years), AC2(5 to 10 years), AC3(10 to 15 years), AC4(15 to 20 years), AC5(>20 years).

Personality of the Mahout and Kavadi

It is clear from the study that kavadis make for better elephant keepers than mahouts. There are a couple of reasons for this; although the mahouts are more knowledgeable of elephants than the kavadis, it is the kavadis who spend more time with elephants than the mahouts. In effect it is the kavadis that the elephant co-operate with than the mahouts. It is very important to maintain the relationship with elephants through regular interaction and contact. This is not true for most mahouts and a few kavadis however. There are a handful of mahouts who even today at the age of 40 and 50 years, spend considerable amount of time with their elephants. The mahouts, who are also the permanent staff of the forest department unlike the kavadis who to a large extent continue to be under temporary posting, seem to develop general sense of lethargy towards their wards which is reflected in their work effort, ability to work with the elephants and the elephants disobedience towards them and a consequent use of aggression on part of the keeper (Fig 27). It is interesting to note that there are mahouts under the temporary work force who do not get classified under the K1 category. On an average elephant-kavadi interaction has a higher frequency of positive behaviors than elephant-mahout interaction (Fig 26, 27). These results suggest that spending more time with the elephants helps the elephant and the keeper to understand one another well and work in harmony irrespective of the posting or the post a keeper holds (Fig 29).

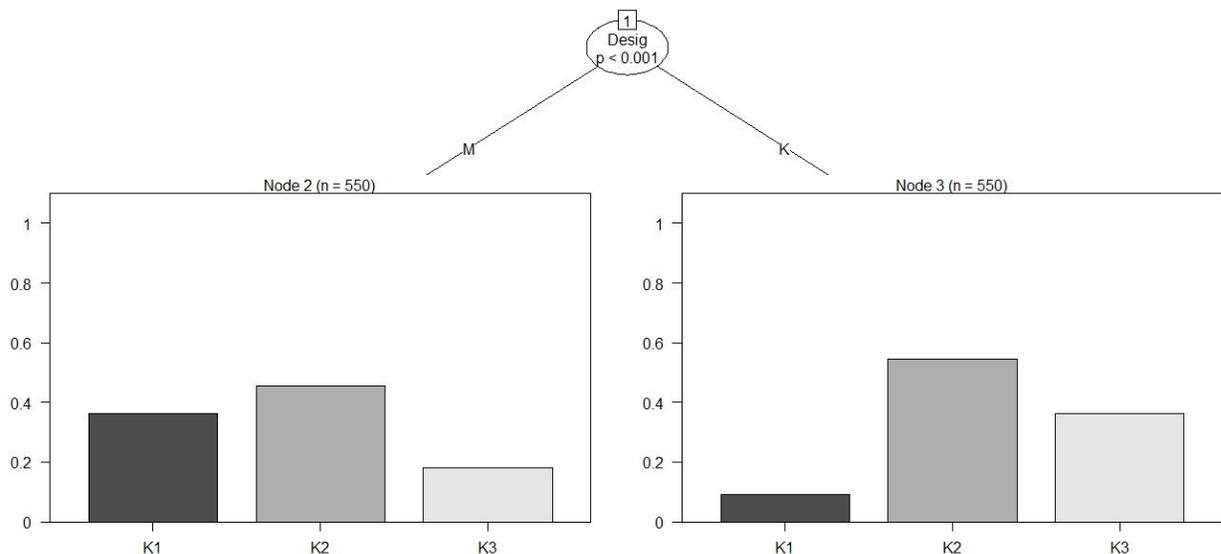


Fig 26: A cumulative ratio of positive and negative behaviors and GEKP displayed by keepers in relation to their posting. Mahout (M), Kavadi (K) and Designation (Desig)

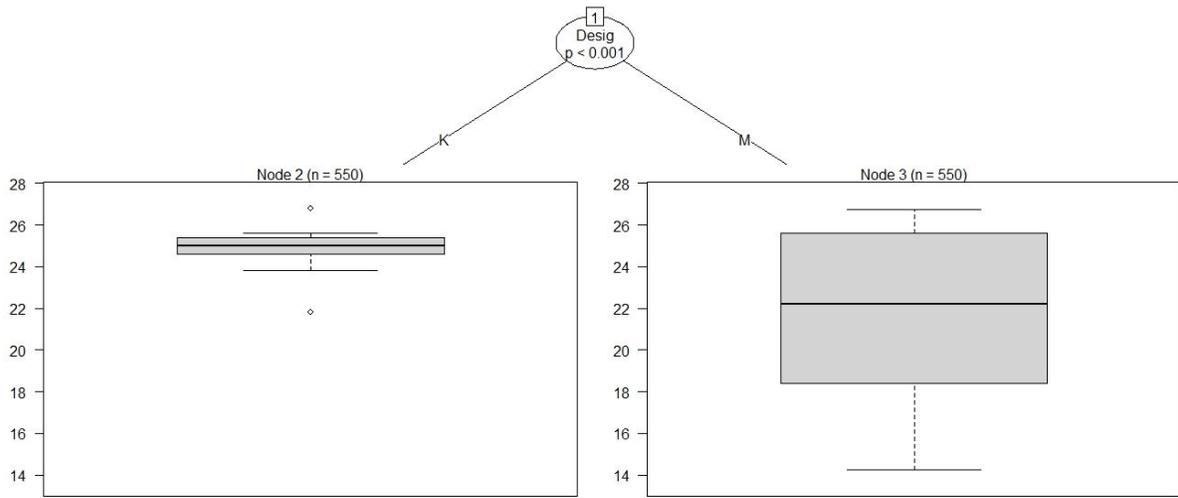


Fig 27: Positive behaviors displayed by the keepers while interacting with the elephants. Mahout (M), Kavadi (K) and Designation (Desig).

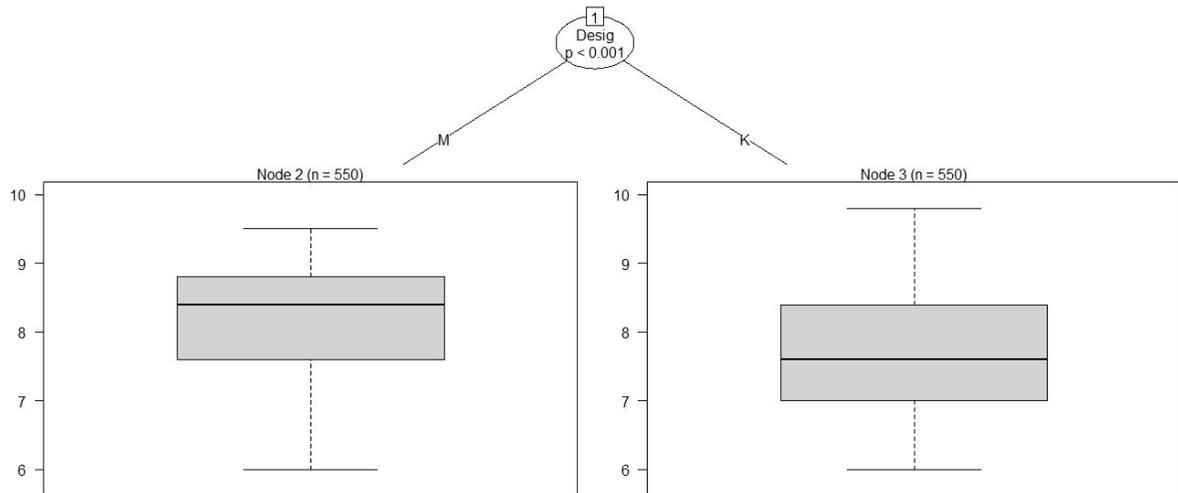


Fig 28: Negative behaviors displayed by the keepers while interacting with the elephants. Mahout (M), Kavadi (K) and Designation (Desig).

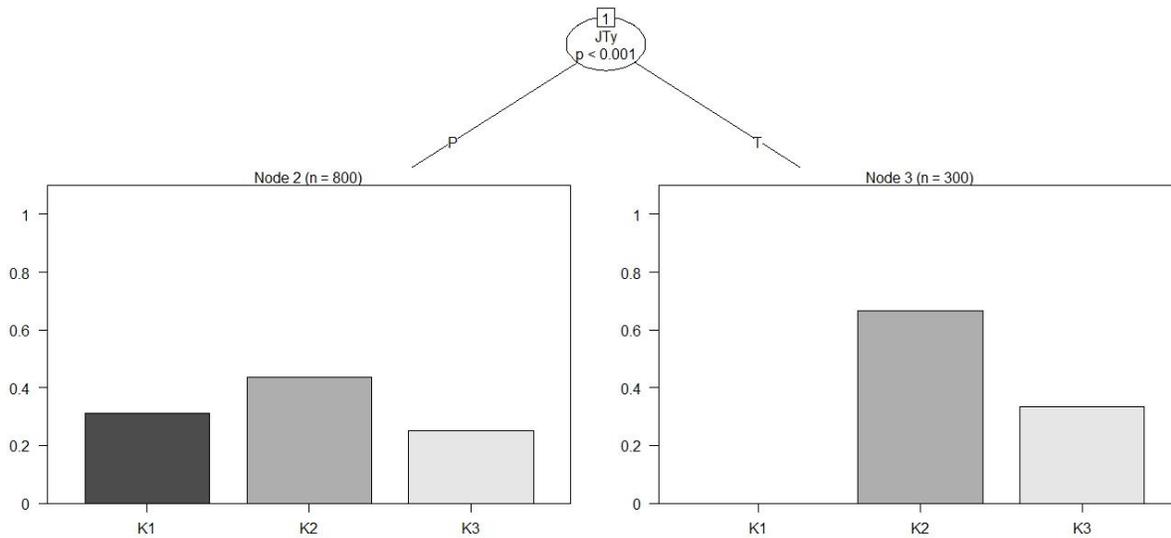


Fig 29: A cumulative ratio of PT and GEKP displayed by keepers in relation to their permanency of posting. Permanent employee (P), Temporary employee (T) and Job type (JT_y).

Keeper-elephant turnover

With increased elephant-keeper turnover (NE), the keepers and the elephants tend to move from the K3 and E3 stages to K1 and E1 stages respectively (Fig 30). This has been identified as one of the biggest problems in elephant management by the keepers themselves. They believe that the bond between a keeper and his elephant takes a long time to develop and be forged (~8 years). Under the current system of management, where the keepers can be changed from one camp to another, from elephant to another due to various reasons including promotion and transfers, turnover seems inevitable. A traditional skilled work such as elephant keeping however, should have a different method of management with ample scope for a mahout to be with his elephant for the longest time possible. A lack of trust and a change in routine are deleterious to the relation between the keeper and the elephant. Elephants in the personality category E1 would be difficult to manage and with increasing keeper turnover the keepers also may tend to neglect the animal. The kavadi who is assisting the mahout should be trained well with an elephant before the mahout is discharged from duties. Familiarity with the elephant and long term association helps both the elephant and the mahout to understand one another, test one another's limits and work in harmony. An increase in the number of elephants handled by a single keeper during his work tenure would also mean that the amount of time spent he spends with a single elephant is very less (<5 years). The positive behaviors displayed by the keeper seem to reduce with increased turnover (Fig 31) and the negative behaviors increase (Fig 32). An increased turnover is different from the years of experience of a keeper in this profession. The obvious explanation to this however is that in a power-equation, the keeper would like to assert his position over the elephant, coupled with the

short period of time that the two get to spend together and the fact that their trust in each other is low untoward incidents can occur leading to the injury or death of either or both.

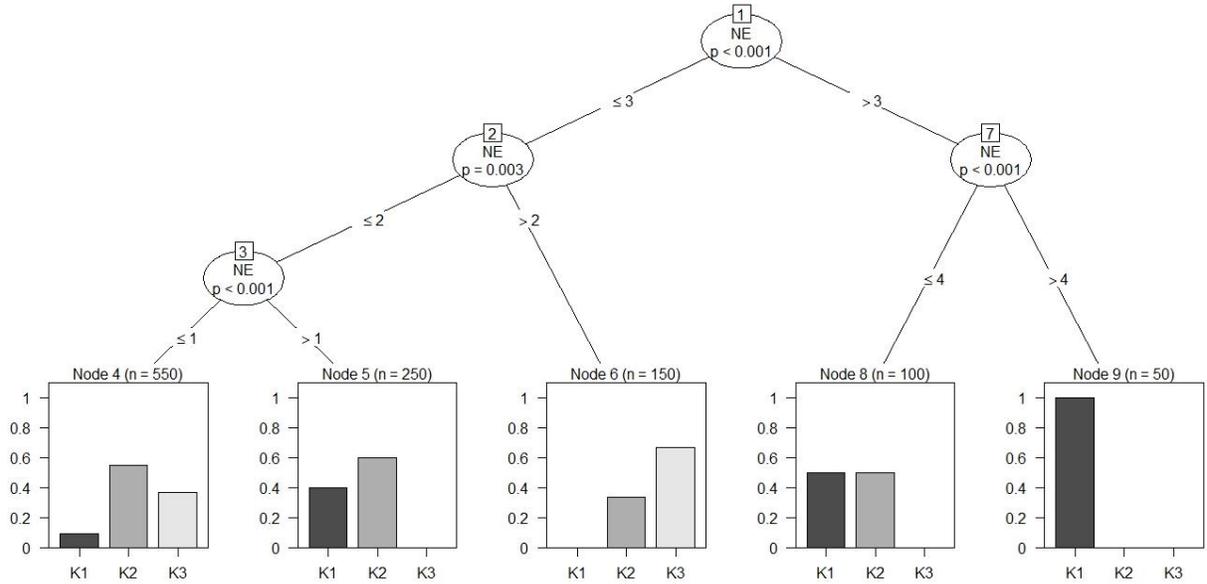


Fig 30: A cumulative ratio of positive and negative behaviors and GEKP displayed by keepers in relation to elephant turnover rate. Number of elephants changed (NE).

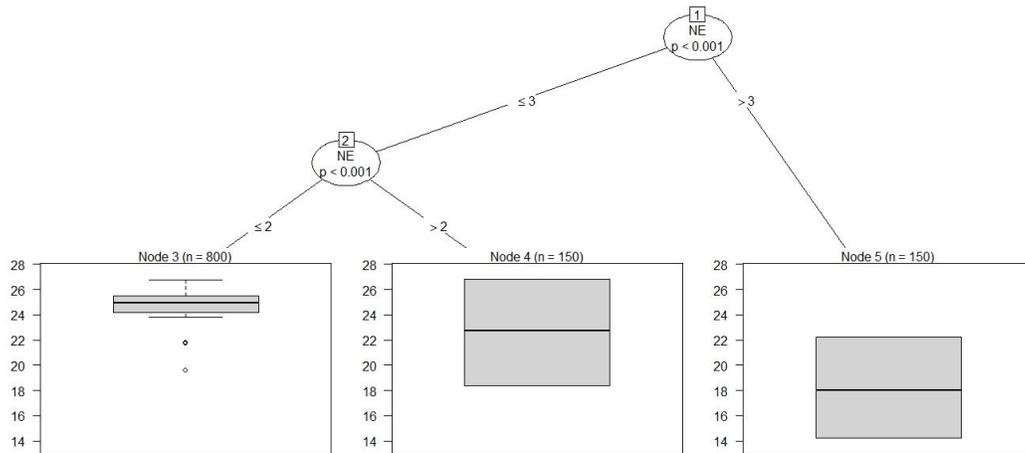


Fig 31: Positive behaviors displayed by keepers while interacting with elephants in relation to their the number of elephants they have worked with (NE)

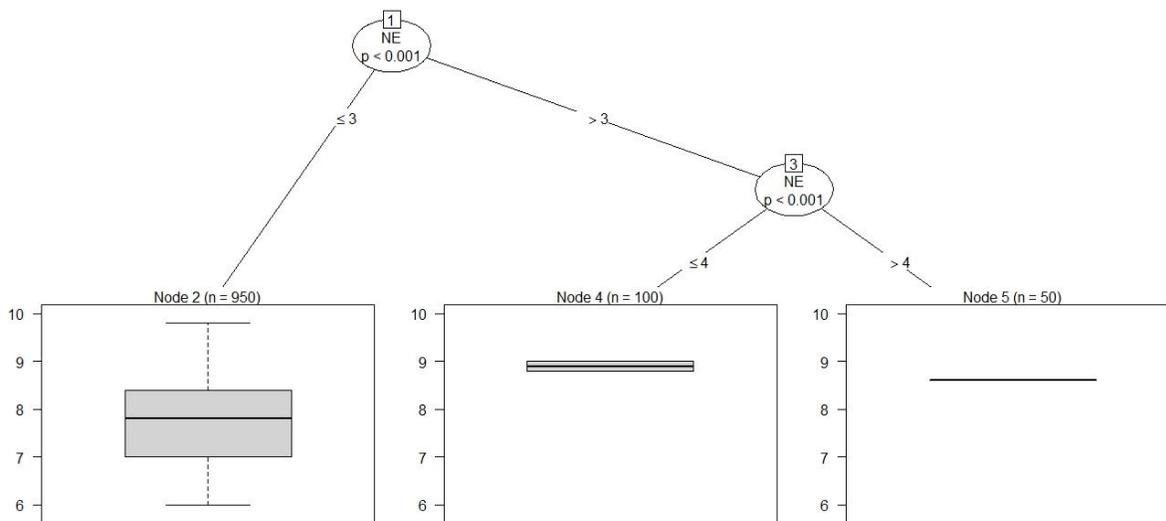


Fig 32: Negative behaviors displayed by keepers while interacting with elephants in relation to their the number of elephants they have worked with (NE)

Years of experience as an elephant keeper

As expected highly experienced keepers (YC5) fall under the K3 category and highly inexperienced keepers (YC1) fall under the category of K2 and K3, while the rest of the keepers (YC2 to YC4) do fall under the K1 category (Fig 33). This may be a reflection of the fact that early career keepers do have the interest to work in this field and to take care of their elephants or that they are doing the same to impress their superiors for the sake of the job. The YC5 stage keepers are the old-school keepers who have been trained under strict regimes in the timber logging camps and are naturally good in this craft.

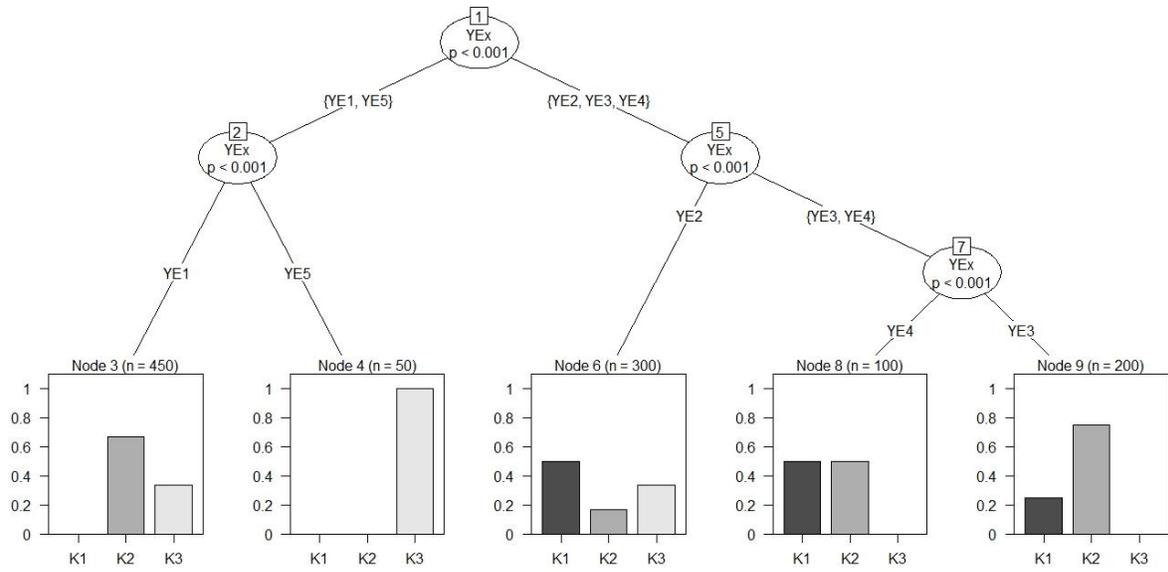


Fig 33: A cumulative ratio of positive and negative behaviors and GEKP displayed by keepers in relation to the years of experience (YEx) in this field.

The way forward

It is also important to explore in detail the cultural history of the elephant men, as their ethnic background and experience seem to play an important role in their attitudes towards elephant keeping and management. Elephant keepers are probably the first to recognize individuality in elephants as they clearly identify difference among individual elephants they have worked with and insist that it takes a relatively long time for them to get accustomed to a new elephant and *vice versa*. It is important to bring to the forefront the unique knowledge that these men possess of elephants and the forest they inhabit in the form of books, short stories, comics and songs. So far, we have recorded three folk songs and short stories that talk about the lives of the elephant keepers, the elephants and the forests. Further studies that explore individual behavior in elephants and their cognitive abilities may be crucial to help improve the welfare of not only the captive elephants but also of their wild cousins in the forests, especially when they come in conflict with the human communities that live around these forests.

Conclusion

With an aim to conserve the last populations of the Asian elephant in India, both in the wild and in captivity, it is important to recognize, preserve and bring to the forefront the deep understanding and knowledge elephant keepers have of their elephants and their habitats.

The following are the pointers to help improve the welfare of elephants in captivity and their keepers;

- Captive elephants and elephant keepers, no longer employed in timber logging operations, spend less time with one another than they used to. Furthermore, the mahouts spend less time with the elephants than the kavadis, and hence, often resort to aggressive behaviors towards their elephants to make them obey. Trust between the keeper and the elephant can be built only by increasing their time spent together caring for each other.
- The turnover rate must be reduced and if possible the elephant and its keeper must be paired for life. Although this could have management problems, in case the mahout falls sick and is off duty. As a contingency plan, the mahout must train his kavadi (for a minimum period of 10 years) and the kavadi must then take over as the mahout of the elephant. The posting of the mahout or kavadi should not be based on the number of years in service but on the understanding and ability of the keeper to work with his individual elephant. This can be done under the supervision of a different mahout but not change hands completely.
- Potentially life-threatening conditions such as alcoholism and quick turnover rates of the keepers and their elephants are severely straining the relationship between the two species.

- Apart from the constant threat to life by their own elephants, the keepers also have to make a living amongst other potentially dangerous wild animals. It would be better to move the existing elephant camps from such areas (with wild elephants and predators) into community or conservation reserves with no competing wildlife and with better access to veterinary care for the elephant. If this is not possible measures should be taken at the camp to prevent wild elephants from attacking the captive ones, especially when chained.
- The current lack and consequently, the urgent need for formal training of elephant keepers by experienced mahouts in 'model elephant camps' is a critical necessity to safeguard the traditional practices of elephant keeping for generations to come.
- Breeding of elephants in captivity has been a perennial problem and continues to be so. Improving the welfare of elephants in captivity coupled with better planning of stock maintenance can help improve the breeding rates of these elephants. Female elephants are easier to manage in captivity than males, however, the current captive elephant population is biased towards males.
- The initial period of 10 years is a vital development stage of an elephant in captivity and must be taken at most care of. It is this period that will determine whether an elephant will display positive or negative behaviors depending on the personality of the keeper in-charge. Well trained and patient keepers are required for elephants during this stage and not just for older individuals. A trainee mahout or a kavadi should train the elephants during this period only under the guidance of an experienced mahout at all times.
- Elephants born in captivity need to be trained with care and their learning can be made exciting for the elephants by using possible positive reinforcement training techniques. The important aspect is for the keeper to dedicate time for his elephant and be patient with it. Remember, more aggression only means a more aggressive and unpredictable elephant during the latter life stages and not necessarily an obedient one.
- It is important that early career keepers and young elephants are paired with old school keepers (AC5) and well trained elephants (YC5) respectively to facilitate mutual learning.
- Management and welfare of elephants in captivity can be improved by simple, but effective, modifications in the daily routines of the individual elephants and their keepers. For example, spending more time with the elephants and learning from older individuals.
- It is thus very important that clear policy-level decisions be adopted not only to enforce these changes but also to have a more enlightened vision for the well-being of elephants in captivity and their keepers.

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APPENDIX 1

Details of Captive Elephants, Mahouts and Kavadis in Karnataka State Forest Elephant Camps

1. Bandipura Elephant Camp – 7 elephants

Chamarajanagar District, Gundulpet Taluk, Mangala Gram Panchayat
Bandipura Range, Bandipur Tiger Reserve

Mahouts and Kavadis belong to the following tribes: JeenuKuruba, Soliga and Muslim
Village: Bandipura forest quarters

2. Moolehole (Rampura) Elephant Camp – 13 elephants

Chamarajanagar District, Gundulpet Taluk, Berambadi Gram Panchayat
Moolehole and Maddur Range, Bandipur Tiger Reserve

Mahouts and Kavadis belong to the following tribes: JeenuKuruba and Muslim
Village: Rampura forest quarters

3. K. Gudi Elephant Camp – 2 elephants

Chamarajanagar District, Yelandur Taluk, Punajanur Gram Panchayat
Yelandur Range, BiligiriRangaswamy Tiger Reserve

Mahouts and Kavadis belong to the following tribes: JeenuKuruba, retired Soliga mahouts
and kavadis are present here
Village: K.Gudi forest camp

4. Balle Elephant Camp – 15 elephants

Mysore District, H.D.Kote Taluk, D.B.Kuppe Gram Panchayat
D.B.Kuppe Range, Nagarahole Tiger Reserve

Mahouts and Kavadis belong to the following tribes: JeenuKuruba and Muslim
Village: Balle forest quarters and BalleHaadi

5. Kanthapura (Mattigodu) Elephant Camp – 19 elephants

Kodagu District, Virajpet Taluk, Thithimathi Gram Panchayat
Anechowkur Range, Nagarahole Tiger Reserve

Mahouts and Kavadis belong to the following tribes: JeenuKuruba
Village: Mattigodu forest quarters

6. Dubare Elephant Camp – 15 elephants
Kodagu District, Madikeri Taluk, Siddapura Gram Panchayat
Kushalanagar Range, Madikeri Wildlife Division

Mahouts and Kavadis belong to the following tribes: JeenuKuruba and Muslim
Village: Dubare (Ammalae) Haadi

7. Anekadu (not an elephant camp but 3 elephants from Dubare are stationed here)
Kodagu District, Madikeri Taluk, Siddapura Gram Panchayat
Kushalanagar Range, Madikeri Wildlife Division

Mahouts and Kavadis belong to the following tribes: JeenuKuruba
Village: Cauvery Nisargadhama

8. Sakrebyle Elephant Camp – 16 elephants
Shimoga District, Shimoga Taluk, Gajanur Gram Panchayat
Sakrebyle Range, Shettihalli Wildlife Sanctuary

Mahouts and Kavadis belong to the following tribes: JeenuKuruba and Muslim
Village: Sakrebyle

Please note that the number of elephants in a particular camp keeps changing as the elephants are moved around for various reasons but the camps listed are permanent.

APPENDIX 2

Questionnaire Survey: Documenting Traditional Knowledge on the Asian Elephant in Captivity

The Keeper

1. Name
2. Age
3. Occupation
4. Years as a mahout/kavadi
5. Number of elephants
6. Number of years with the current elephant
7. Place of birth
8. Tribe
9. Permanent/temporary employment
10. Occupation before being mahout/kavadi
11. What is the role of the mahout/kavadi?
12. Family status (wife, children)
13. Why did you choose this career?
14. Learnt or taught professional practices?
15. Can these be taught to others from different backgrounds?
16. Do you have the necessary skills to train others?
17. Are you satisfied with your profession?
18. What are the advantages of being in this profession?
19. What are the disadvantages of being in this profession?
20. What can and needs to be improved?
21. How can the situation be improved?
22. What is your daily routine (chronologically)?
23. What does it take to be a mahout/kavadi (knowledge and skill sets)?
24. What are the hazards of the occupation?
25. Do you have habits/hobbies?
26. Mention three of your weaknesses
27. Mention three of your strengths
28. Do you think it is a respectable profession (are you proud of yourself)?
29. Do you have any insecurity (are you intimidated)?
30. Would you like your children to follow in your footsteps?
31. If so, why or if not, why?
32. Do you think all the mahouts have the required skill sets?
33. If not, what can be done to improve the same?
34. Do you think you are a better mahout/kavadi than the others or worse?
35. If so, why and how?

36. Do you find that elephant management practices have changed overtime?
37. If so, how and why?
38. If not, how and why?

The Elephant:

39. Name
40. Gender
41. Age
42. Age at capture
43. Social organization when captured
44. Elephants involved in capture
45. Source
46. Reason for capture
47. Years in captivity
48. Nature of the elephant before capture
49. Nature of the elephant after capture and training
50. Killed or injured personnel before capture?
51. Killed or injured personnel ever since capture?
52. Types of commands learnt (foot, vocal, visual, scent)
53. Number of commands learnt under each category
54. Do you use tools?
55. Types and their number of tools used
56. Frequency of tool use
57. Points of use and purpose of the tools
58. Are you satisfied with the tool use?
59. Do you have any suggestions to improve them?
60. Method of capture
61. Are you satisfied with the method?
62. How can it be improved?
63. Method of training
64. Duration of training
65. Are you satisfied with the training?
66. How can it be improved?
69. Do you think elephants need to interact with conspecifics (captive and/or wild)
70. Daily routine of the elephant
71. Can you determine whether an elephant likes you or not?
72. If so, how?
73. Can you determine whether an elephant likes a particular activity or not?
74. If so, how?
75. Can you determine whether an elephant likes a particular command, food item etc or not?

76. If so, how?
77. Name three activities the elephant likes
78. Name three activities the elephant dislikes
79. Does the elephant obey all commands immediately or resent?
80. Name three commands your elephant resents
81. What do you do when an elephant resents?
82. Name three commands the elephant responds immediately to
83. What do you do when an elephant responds?
84. Name three food items your elephant likes
85. Name three food items your elephant dislikes
86. Name three fodder plants your elephant likes
87. Name three fodder plants that are abundant in the area
88. Name three fodder plants your elephant dislikes or does not eat
89. Name three fodder plants that are rare in the area
90. Name three fears of your elephant
91. Is your elephant addicted to anything?
92. When did the addiction start (what age)?
93. How did the addiction start (learnt or taught)?
94. Can your elephant perform tasks?
95. Name a few tasks
96. Does the elephant improvise in certain situations?
97. Does your elephant use tools?
98. Mention a few examples of tool use
99. Did you teach them or did the elephant learn on its own or from other elephants?
100. Mention three strengths of your elephant
101. Mention three weaknesses of your elephant
102. How much does your elephant feed?
103. How much does your elephant drink?
104. What does your elephant feed?
105. Any injuries or diseases?
106. Can you detect internal injuries or diseases or discomfort?
107. What are the symptoms?
108. Can you prepare medicines/first aid locally?
109. Where did you learn these practices?
110. Do elephants eat certain plants during disease, disorder, injury, or under other physiological conditions?
111. Mention three herbal medicines and the corresponding disorders
112. Can you detect an elephant in musth?
113. What signs do you use?
114. What do you do when your elephant is in musth?
115. Do elephants in musth feed specifically on certain plant parts?

116. Can you assess an elephant's need or intention?
117. Can you describe aggression/anxiety/comfort/depression/calmness
118. How do you make the elephant listen to you?
119. Why does the elephant listen to you?
120. Why does the elephant not go back into the forest?
121. How do you track the elephant?
122. What signs do you read?
123. Are you confident while on top of the elephant?
124. Can you determine whether the elephant is confident or fearful of you?
125. Can you predict an elephant's behavior or mood?
126. How?
127. Describe the behaviors
128. Do you need to be careful around your elephant?
129. Why?
130. What precautions do you take?
131. Do you think your elephant is better than the others or worse?
132. If so, why and how?
133. What kind of a relationship do you think you share with the elephant?

Elephants in general:

134. How long do elephants live?
135. How much do they eat?
136. How long do they eat?
137. How much do they drink?
138. How long do they rest?
139. How do elephants find food?
140. Where do they live (habitat types)?
141. What is their distribution?
142. How many species of elephants are there?
143. How many elephants are there in the wild?
144. How many calves do they give birth to in a lifetime?
145. When do elephants come into heat?
146. Till what age can they become pregnant?
147. When do elephants come into musth?
148. How long are they in musth?
149. At which age do they come into musth?
150. What is a makhana?
151. Name a few common diseases, disorders and injuries
152. Are the elephant numbers increasing or decreasing?
153. Why?
154. What, according to you, are the threats to elephants?

155. How do you think these threats can be reduced?
156. Can human-elephant conflict be prevented?
157. If so, how and if not, why?
158. Why do elephants raid crops?
159. Do you think human-elephant conflict is increasing or decreasing?
160. Why?
161. Mention a few mitigation measures
162. Do you think they work?
163. What, according to you, works best?
164. Does an elephant adapt to situations?
165. Do you think elephants and humans can co-exist?
166. Why? And how?
167. What is an elephant to you?

APPENDIX 3

Ethogram for Elephant Behavior

Trait	Definition	Measures
Confident	Positive behaviour, secure, poised, sure of oneself, not hesitant	Performs task/activity in an assured manner, is not finicky around mahouts or other elephants, is consistent, is predictable
Effective	Performs a task or command satisfactorily, is unhindered by other elephants, good in controlling other elephants, subordinates others	Dominant, knows commands, easy to work with, performs all tasks, useful for working, gets the work done
Understanding	Responds or reacts positively to stimuli (behaviour of conspecifics/mahouts), considerate and obliging,	Head-nodding while interacting, blowing, short vocalizations, knows the routine, adjusting, listens/observes keenly the mahout's/elephant's every command/activity and responds positively in unison (independent decision/voluntary)
Obedient	Perceives commands effectively, subservient, complies with orders	Frequency of commands, tone of command, use of tools by the keeper, time lag to perform a task, listens/observes keenly to the mahout's/elephant's every command/activity and obeys them (forced decision)
Apprehensive	Anxious/nervous to perform a new task, feels insecure, hesitant	Backing out with trunk curled and ears held out and not flapping, tail stiff, finicky, restless while performing tasks or in company of conspecifics

Fearful	Inbuilt sense of impending danger, withdraws whether mahout/elephant is harsh or not or when there is a problem or not, overtly cautious and scared	Blinking eyes/twitching the eyes, cringing, tail swirled, ears out and not flapping, running/scooting, vocalizing, hiding, reversing
Popular	Liked by other elephants and mahouts, admired, and is widely discussed	For the mahouts: Attractive, proud, performs all tasks/obeys, is famous, earns income For other elephants: Prefer to spend more time with, obeys and submits voluntarily
Helpful	Useful for work and supports mahout/other elephants at times of need	Bringing down trees/bamboos for communal feeding, carrying logs and forage to other elephants and the camp, baby sitting/protective of young or loved ones, reassuring, passing fodder to other elephants
Sociable	Friendly, accepting, non-avoidant, outgoing, good companion to mahouts and other elephants	Associating with other elephants, socializing, playful, communicating, social play, trunk tangling/caressing other elephants
Caring	Sensitive, compassionate, generous, warm, passive, loving, responding, extends support and compassion towards mahouts/other elephants	Body contact, trunk in mouth (contextual), paying attention to details, unconditional love, understanding and interpreting signs, frequency of use of controlling tools, types of tools, tone of command, speaking to the elephant (tone), touching the animal (patting, brushing, cleaning), care while feeding, maintenance of tethering site, timely medication and up-keep, special acts of the elephant like carrying the mahout, touching the mouth, trunk of other elephants

Playful	Involves in play with others	Head butting, tussling, trunk over the body, mounting, challenging tasks/tricks played by the mahout, cheerful, happy, spirited mahoutpushing against mahout/other elephants
Aggressive	Forceful and assertive, even harmful and life threatening, harming others (mahouts/other elephants)	Rolling eyes, enlarged eyes,reddened eyes, aggression, kicking mud/ground, standing display, mock charge, throwing objects, head bobbing with trunk rolled on the tusk (disobedience), dusting, ears out, head held high, tail upright or twitching
Opportunistic or unpredictable (it is very difficult to tease these two apart)	Uses any available chance to seize the opportunity and secretive around others	Unprovoked attacks, sneaky (mating, feeding), sudden blow with trunk, striking with tusk while feeding
Unpredictable	Reacts negatively with less or no provocation	Sudden hurling stones/mud/other objects
Demanding	Seeks attention and needs more time and effort than others, selfish	Open mouth while feeding with other elephants, pushing/shoving away other elephants

APPENDIX 4

Keeper effort/activities

Morning duties

Morning tracking of the elephant
Checking the condition of the dung
Speaking to and patting the elephant
Le, Aare and Baith command
Removing the hobbles
Preparing the leaves
Dusting the elephant
Checking for wounds/cuts and bruises
Remounting the trail chain
Mounting the elephant
Training in commands
Tasks (carrying wood, temple)
Visiting home
Home food
Watering
Lining up
Re-hobbling
Bringing the ration
Preparing the kusuræ
Feeding the elephant
Oiling the forehead and legs
Removing the hobbles
Mounting the elephant
Watering
Selecting fodder site
Pruning trees
Re-hobbling
Dismounting the trail chain
Speaking to and patting the elephant

Late-afternoon duties

Afternoon tracking of the elephant
Checking the condition of the dung
Speaking to and patting the elephant
Le, Aare and Baith command
Removing the hobbles
Preparing the leaves

Dusting the elephant
Checking for wounds/cuts and bruises
Remounting the trail chain
Mounting the elephant
Watering
Bathing
Doob command
Washing deep in the water
Checking for wounds/cuts and bruises
Remounting the trail chain
Mounting the elephant
Lining up
Re-hobbling
Preparing the special ration
Feeding the special ration
Bringing the regular ration
Preparing the kusuræ
Feeding the elephant
Oiling the forehead and legs
Removing the hobbles
Mounting the elephant
Selecting fodder site
Pruning trees
Re-hobbling
Dismounting the trail chain
Speaking to and patting the elephant

Other Duties

Cooking special ration
Cleaning the tethering site
Cleaning the ration room
Bringing fodder for other elephants
Staying with the elephant in the afternoon

Necessary evils

Use of stick
Use of ankush
Use of ballam
Hobbles
Chains
Working the elephant
Walking with the elephant

Abusive words
Tethering the elephant while bathing

APPENDIX 5

Details of the elephants observed for personality traits

Name	Sex	Age	Source
Ram	Female	6	Born in captivity
Yog	Female	7	Born in captivity
Kok	Female	65	Captured
Raj	Male	66	Captured
Var	Female	60	Captured
Kum	Male	35	Captured
Sar	Male	15	Born in captivity
Gan	Female	17	Born in captivity
SarF	Female	60	Captured
Mar	Female	55	Captured
Arj	Male	52	Captured

APPENDIX 6

Details of the elephant keepers observed for personality traits and good elephant keeping practices

Name	Age	Occupation
Bas	18	Kavadi
Rav	21	kavadi
Sat	25	kavadi
Gun	34	kavadi
Mad	28	kavadi
Das	29	kavadi
Har	26	kavadi
Ram	45	Mahout
Mot	30	Kavadi
Dod	54	Mahout
Rav	46	Mahout
May	38	Mahout
Vin	25	Kavadi
Sal	28	Mahout
Man	22	Kavadi
RamJ	25	kavadi
Raj	25	kavadi
San	26	kavadi

APPENDIX 7

Photographs from different forest camps



Induction into elephant keeping at an early age





Keepers working with their elephants





Food for elephants





Bathing and free-ranging in the forest





Housing for the elephant keepers





Keepers consider elephants as god among other forest deities





The knowledge is transferred from father to son or at most to close relatives





Working with elephants is a fun and learning time





Senior mahouts interacting with their elephants





A power equation at times





Treating elephants injured by wild bulls is common when in an elephant reserve





“They are big and not one is like the other, but we are clever. They are mighty, but we know their weaknesses. They are quick learners, but we do not teach them everything. Beware, they are Gods so respect them, but do keep them in check”

- Dobi

Rules of elephant-keeping in the words of a mahout

