ASSESSING
WORK MOTIVATION
OF FOREST GUARDS

MAHARASHTRA

महाराष्ट्र वन विभाग

Wildlife
Conservation
Trust

ACKNOWLEDGEMENT

2019
Wildlife Conservation Trust, India

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EXECUTIVE SUMMARY

The Wildlife Conservation Trust (WCT) has, for over a decade, been striving to improve the working and living conditions of frontline forest staff across India. By providing basic equipment and training we aim to ensure that rudimentary amenities are available to them to perform their duties. However, this does not necessarily ensure a motivated field staff. It is a well-established fact that motivation levels are correlated to efficiency and efficacy of work, especially given the demanding work conditions of frontline forest staff. Motivated field staff is thus critical for the protection of our forests

This report presents findings from a study of work motivation of forest guards and its implications on their employment policy. A randomised sample of forest guards from four different Protected Areas in Maharashtra responded to questionnaires to measure employee satisfaction and motivation. Machine-learning-based classification and regression tree (CART) analysis suggested that Education, Sense of Achievement, Perception of Policies, and Equipment are important predictors of connectedness with the work of forest guards.

The following policy and management recommendations are suggested based on the analysis:

1. **Increase sense of achievement among forest guards:** Job profile of forest guards in tiger reserves should be modified to link achievements at work to community-based rewards, enhancing social status. This can be done by starting initiatives within forest department to recognize outstanding performers in public events. Rope in media to create a high social status of forest guards such as of the paramilitary forces. Further, immediate actionable should be tweaking of job profiles at the park-level by the field directors, to incorporate possible small rewards for good performance including praise from reporting officers. Eliminating perceived disparities in pay is an important area that can enhance sense of achievement, this can be done by a special tiger reserve allowance for field staff.

2. **Improvements in human resource management:** The freedom of decision making, allowing forest guards to try their own methods within their scope of work with regular constructive feedback from the reporting officer. Rotation of assigned anti-poaching camps every few months may also help. It is critical that human resource management training is provided to Range Forest Officers and Assistant Conservator of Forests.

3. **Improve conditions of anti-poaching camps:** Clean water, equipment charging facilities, light, and basic amenities must be available at the anti-poaching camps. Institute a robust system to ensure immediate replacement of essential equipment. Representation of guards in procuring equipment for anti-poaching camps has to be mandated.

4. **Safety:** The current condition of the anti-poaching camps needs to be improved on account of safety. Anti-poaching camps need to have better fencing and forest guards need training in basic safety. Forest guards need to be sensitised on ensuring safety in forests.

5. **Psychological health:** The work of forest guards is demanding and is predominantly carried out in isolated areas. An institutional mechanism needs to be put in place for periodic monitoring of their mental health. This may include medical facilities and counselling.

6. **Retain minimum qualification criteria for forest guards:** The current education criteria of HSC (or completion of 12th standard) for forest guard recruitment should be retained and should not be lowered.

7. **Financial rewards commensurate to efforts:** We recommend effort-based financial incentives for the forest guards. We suggest that the government should institute a special wildlife allowance at least in tiger reserves.

CONTENTS

TECHNICAL TERMS

1. Principal Component Analysis - Is a statistical method used to reduce the number of variables used for analyses by grouping similar (correlated) variables.

2. Minnesota Satisfaction Questionnaire - Is a standardised questionnaire used for measuring employees' job satisfaction.

3. Implicit Association Test - Is a test used in social psychology for measuring association between two factors.

1. BACKDROP

Forest guards in India protect some of the world's most valuable ecosystems and the last refuges of various threatened species. Their job profile entails physically challenging and psychologically demanding working conditions as they carry out the last mile implementation of protection policies and enforcement of law. The support staff they have for assistance in their line of duty are one to three daily wage employees.

Maharashtra is one of the two states that have the highest number of tiger reserves in India. Apart from housing 190 tigers, these tiger reserves are the catchment areas for rivers contributing significantly to the water security of the state. This makes their protection particularly pertinent for the welfare of the people of the state. Since work motivation affects work performance, the work motivation of forest guards is a crucial cog in ensuring the protection of these tiger reserves. The report tries to understand the factors affecting motivation of forest guards.

The report begins by reviewing working conditions and psychological aspects of forest guards' job in the Protected Areas. It further presents results and implications of data obtained on implicit cognition, motivation, and attributes related to work conditions of forest guards.

2. WORKING CONDITIONS OF FOREST GUARDS

The working conditions of forest guards in tiger reserves are more challenging compared to other forest department wings (i.e., Social Forestry, Territorial, and Forest Development Corporation). They are required to stay in the anti-poaching camps or protection hut along with up to three *vanamajur* (daily-wage workers). The forest guards can avail only four days of leave per month, and rarely get to visit their family.

As per the Maharashtra Forest Manual (Volume 2011), duties of a forest guard include foot-patrol (which can be as much as 45 km per week), monitoring tiger population and prey densities, management of water resources, creation and maintenance of fire-lines, forest fire fighting, management of human-wildlife interface in nearby villages, maintaining roads in the tiger reserves, and protecting the forest against grazing, wood cutting, trespassing, wildlife crime investigation etc. Each forest guard is responsible for at least one forest beat. The size of the beat varies from generally 500 to 1500 ha. Forest guard operates out of the remotely located anti-poaching camps in forest; most of which have rudimentary facilities, like a metal bed, a storage trunk, solar-powered lighting (one LED light and wireless radio set charger). In many cases, some of the equipment is dysfunctional. These camps do not have electricity and piped water supply making working and living conditions difficult. These unique and challenging conditions affect the aspects of the work motivation of forest guards.

3. PSYCHOLOGICAL ASSESSMENTS

3.1 Psychological aspects of work motivation

In the science of psychology, work motivation is conceptualised in multiple ways, which has led to the construction of different theories about it. Among them, job based theories form one such division and have been used as a primary theoretical tool to understand work motivation, which has been used in this study. This approach focuses on analysing attributes of work and working conditions as primary drivers of work motivation. Employee satisfaction has been defined in many ways (e.g., Spector, 1997). Intrinsic and extrinsic are commonly considered aspects of employee motivation and measures have been developed around them (e.g., Warr, Cook, and Wall, 1979). Intrinsic motivation is defined as emerging from within an individual due to their own will and interest. Employees who are intrinsically motivated enjoy their work including the challenges that come with it. On the other hand, if employees are extrinsically motivated then rewards are required to sustain the work motivation. Although intrinsic and extrinsic are commonly considered factors that define motivation, understanding attributes of work presents a wholesome picture of work motivation. The two-factor theory and Job-Characteristics Model are frequently reported among models that analyse attributes of work.

Herzberg's (1966) two-factor theory assumes that the content of the job is the primary driver of a person's motivation and it understands job motivation in terms of two factors: Motivators and Hygiene factors. The Hygiene factors include pay, job security, status, working conditions, fringe benefits, job policies, and relations with co-workers. The Motivators as a factor includes degree of challenge, responsibility, recognition for achievement, opportunity to do meaningful work, involvement in decision making, and sense of importance for organisation. Hygiene factors are external to work and their absence causes dissatisfaction. Job satisfaction is a function of motivators. Gagné & Panaccio (2014) concluded that, "the two-factor theory provides interesting insights into the role that need satisfaction may play in eliciting motivation." (p. 167).

The present report has investigated work motivation of the forest guards using the theoretical frameworks of employee satisfaction, Herzberg's two factor theory and Job Characteristics Model.

3.2 Studies on work motivation

Hackman and Oldham (1976) provided a detailed causal model of employee motivation based on job characteristics, arguing that the nature of tasks itself is the key to work motivation. The model proposes five core job characteristics (skill variety, task identity, task significance, autonomy, and feedback) that influence three critical psychological states (experienced meaningfulness, experienced responsibility for outcomes, and knowledge of the actual results), which in turn lead to work outcomes (job satisfaction, less absenteeism, work motivation, etc.). By highlighting the importance of the order of needs from the Maslow's Hierarchy of Needs, their research showed that individuals with lower-order needs, which include physiological needs, safety and love, were less motivated by enriching characteristics of the job like variety, independence, and feedback. On the contrary, individuals with strong higher-order needs, which include self-actualisation, self-esteem, do well and experience more job satisfaction with enhanced job characteristics (Maslow, 1968). Cross-cultural reviews of job satisfaction (Judge et al., 2011) concluded that Job Characteristics Model is one of few theories that garnered the most support across cultures. Deci and Ryan (2014) reviewed importance of universal psychological needs for understanding motivation in the workplaces to make them more nourishing for employees. They argue that, "human beings have deeply evolved psychological needs to be competent, autonomous, and related to

others, such that, in contexts where these needs are satisfied, people evidence more volitional, high-quality motivation and greater well-being, and when these psychological needs are thwarted, people display various forms of diminished motivation and more symptoms of ill-being" (p. 13). Deci and Ryan (2011) argued that "people's 'psychological experiences' are the regnant causes of their behaviours that will enhance the people's autonomous motivation, mindfulness, perceived competence, and feelings of relatedness to others" (p. 18). Many researches, reviews and meta-analyses have confirmed relationship between employee motivation and employee performance (e.g., Latham, 2007; Wright, 2001).

Among the studies on analysis of structure of job satisfaction in an Indian industrial context, Takalkar & Coovert (1994) found support for the generalisability of the job satisfaction dimensions developed in the USA (also see Sekaran, 1983). Erez's (1994) findings were that Scandinavian, German, Japanese, and Indian researches focused more on employee well-being and satisfaction unlike USA and Israel that focus on performance appraisal. Pareek (1974) provided a three-level conceptual model of work motivation with psychological needs at level one, work role and commitment at level two and satisfaction at level three.
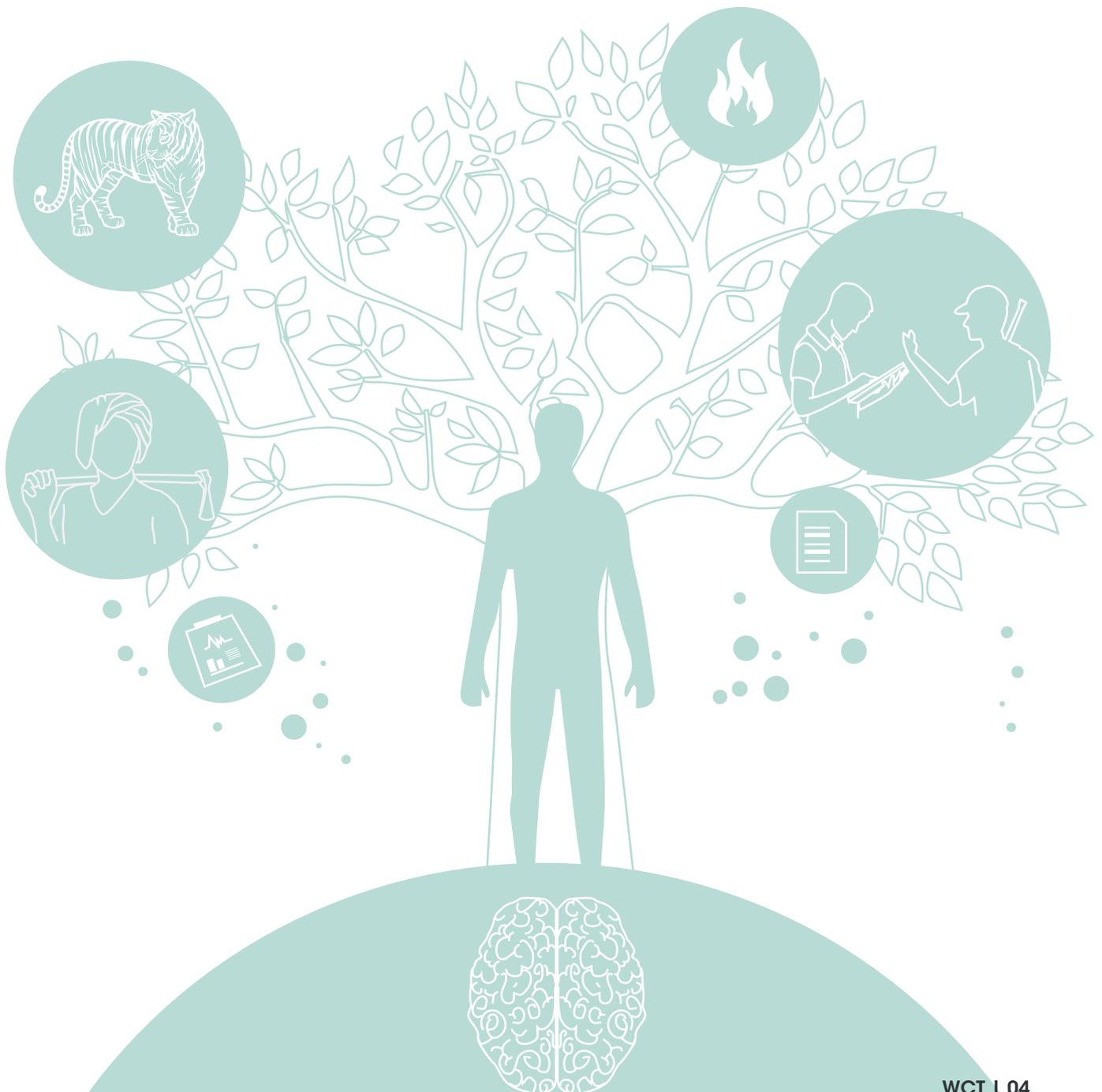
3.3 Studies on forest guards

Across the globe, quite a few studies have focused on the physical health of forest workers. (e.g., Futatsuka et al., 1989, Koskimies et al., 1992, Lilley et al., 2002, Gallis, 2006). However, very few papers have focused on psychological, motivational and work performance aspects of forest workers (e.g., Tsioras, 2010, 2012).

The World Wide Fund (WWF) rangers' survey of Asian forest workers (WWF and RFA, 2016) concluded that 77% rangers get to spend less than 10 days a month with their families, 74% believe equipment are required for safety and 30% reported low pay, staying away from family, poor facilities, and dangerous working conditions as the worst aspects of their job. They reported that their joy in the job, closeness to nature, and poor alternate opportunities of employment are the major reasons to stay back in the job.

In a survey of 530 rangers working in 39 conservation areas in 11 Asian countries, Moreto et al. (2017) studied the desire of rangers to see their children become rangers. They found that extrinsically motivated rangers were in favour of their children entering the same profession whereas intrinsically motivated rangers were concerned about the limitation of work conditions. While analysing protection of forest areas in India, Robinson et al. (2010) concluded that enforcement challenges include "underfunded enforcement agencies, underpaid staff with incentives that differ from those who set the rules, and inefficient institutions. Protection efforts are further complicated by poverty and resource dependence, low penalties, relatively high costs of enforcement, and conflict between managers and rural people's needs" (p. 36).

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3.4 Need for this study

Systematic studies of motivational and psychological aspects of forest guards in India are lacking. Previous work done in India has focused on theoretical analysis or qualitative data of forest guards. Vasan (2002) presented ethnography of the social and professional life of forest guards in Himachal Pradesh to suggest useful changes in implementation of forest policies in India. Nowlakha (2017) reported a theoretical analysis based on anecdotal account and macro level data, which stated some issues faced by forest guards. They include staff shortage, isolation and poor access of camps, drinking water, conflict situations, etc.

Both the datasets are either small and non-representative, or anecdotal. As a result, the analysis lacks robustness and fails to give solutions that are replicable. Comparatively, Ojha and Gairola (2014) presented a quantitatively better account of job performance of forest guards in India. They studied task and contextual performance, and reported positive impact of task orientation and intrinsic motivation, strong negative impact of job stress, and moderate negative impact of hygiene factors on task performance. In addition, for contextual performance, they reported moderate positive impact of success orientation and negative impact of job stresses. They found that job satisfaction was not related to task or contextual performance. Their analysis suffers from multicollinearity issues, limitations of non-random samples, and social desirability response set because the data was collected by the Principal Chief Conservator of Forests.

4. THE STUDY

4.1 Present work

The present study was designed considering the importance of hygiene factors, motivators, and job characteristics for duties performed by forest guards. Forest guards work in extreme and challenging conditions. The forest being their primary work environment, association with forest is an important determinant of their work performance. The self-reported measures of association typically suffer from problems of social desirability. Hence, the Implicit Association Test protocol is adapted for this purpose (Greenwald & Banaji, 1995). Such association measures have not been employed in studies of the forest workers anywhere in the world. The present study evaluates work motivation, perception of safety, availability and functionality of equipment, cost of equipment, training, and other demographic variables as predictors of implicit association with forest.

4.2 Study design

The study collected data from 60 forest guards. The participants were sampled from four Protected Areas out of which three are tiger reserves (TRs) and one is a wild life sanctuary (WLS). At least 20% anti-poaching camps were sampled from each Protected Area. The Protected Areas include Pench TR - Maharashtra (n = 26), Nawegaon-Nagzira TR (n = 22), Bor TR (n = 6), and Umred-Karhandla WLS (n = 6). Usually, one forest guard is assigned to an anti-poaching camp. The number of anti-poaching camps in each Protected Area, as per data received from the respective Field Directors for the year 2015-16 is as follows

Protected Area	Number of Anti-Poaching Camps
Pench TR (Maharashtra)	46
Nawegaon-Nagzira TR	56
Bor TR	15*
Umred Karandla	14

*There are 29 anti-poaching camps, however, 15 anti-poaching camps had been assigned a forest guards during the study.

The anti-poaching camps were selected from each Protected Area using stratified random sampling. The sample was stratified according to the forest range of their current posting. The list of all forest guards for every range was acquired and 25% were randomly selected in each range. In most of the cases, the forest guards responded to the scales at their anti-poaching camps.

Psychological tests, computerised techniques for measurement of Cognitive Association with work conditions, survey questionnaire, and secondary data from WCT database mentioned below were used:

Minnesota Satisfaction Questionnaire (MSQ): A 5-point Likert-type scale of the short version of Minnesota Satisfaction Questionnaire developed by Weiss et al. (1967) was used. The Minnesota Satisfaction Questionnaire has been widely used and has excellent psychometric properties, which include coefficient alpha and stability over time. It is adapted in various languages. The three principal components were obtained on the present data and used in the analysis. Please refer to Appendix 1 for the Minnesota Satisfaction Questionnaire and the principal components.

Safety Questionnaire (SQ): An eight-item scale was developed for the purpose of this research by psychologists from the Department of Applied Psychology, University of Mumbai. The questions were evaluated by psychologists and conservationists for their relevance and only questions of high-relevance were retained. The safety questionnaire and the principal components are reported in Appendix 2.

Implicit Association Test (IAT): A Forest-IAT was developed for this survey by Dr. Vivek Belhekar, Associate Professor, Department of Applied Psychology, University of Mumbai. It is a computer program to assess the association with the forest which was built on OpenSesame 3.1 (Mathôt et al., 2012). The computerised psychological measure assesses the implicit association with forest. It provides as an output, the IAT D-score which is a standard normal variable, where higher score indicates positive association with forest. The details are reported in Appendix 3.

Survey Questionnaire: The Survey Questionnaire included demographic variables like education, years of service, and age. Education was reported as the number of years spent in formal education in India and years of service as the number of years employed in the forest department as a forest guard.

Cost of Equipment (Cost): Equipment available at the camp as reported by the forest guards was converted to a cost index using prices from WCT's database of donated equipment as weights.

Permission from state authorities to conduct the surveys was obtained. To avoid social desirability in responses, data were obtained individually at the anti-poaching camps. The forest guards responded to Forest-IAT, and interview. They also responded to questionnaires. On an average, five forest guards were surveyed in a day. Data collection continued over a period of one month.

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5. RESULTS

Data were carefully analysed for univariate and multivariate outliers and three data points were deleted for being extreme univariate values. One data point was deleted for data inconsistency. Multivariate outliers were evaluated using Mahalanobis distance for implicit association test score, Minnesota Satisfaction Questionnaire Score, and Safety Score. The $\chi^2 = 16.27, df = 3, p = 0.0001$ whereas the highest obtained Mahalanobis radii value was 10.06.

5.1 Dimension reduction:

The factor analysis of Minnesota Satisfaction Questionnaire resulted in three significant factors: Sense of Achievement, Work Condition and Perception of Policies. The factor pattern matrix for these is reported in Appendix 1. The Factor Analysis of the safety resulted in five factors. They are (1) need for Safety (nSafety), (2) self-defence equipment leading to a sense of safety (nEquip), (3) need for comfort (nComf), (4) belief that safety depends on behaviour (BBS), and (5) unpredictability of safety in forest (Unpredictability). The statistical details of the procedure are reported in Appendix 2.

5.2 Correlational analysis

The Pearson's product-moment correlations between all variables were evaluated. The correlation of Forest-IAT with Education, $r = 0.48, t (58) = 4.19, df = 58, p < 0.001$, and nSafety, $r = -0.28, t (58) = -2.22, p < 0.05$, were negative and with Sense of Achievement, $r = 0.33, t (58) = 2.70, p < 0.01$, were positive. The correlation of Age with Education, $r = -0.54, t (58) = 4.94, p < 0.001$, were negative and correlation between Sense of Achievement and Unpredictability, $r = -0.30, t (58) = 2.14, p < 0.05$, were negative.

5.3 Predictive analysis

Multiple regression analyses were carried out to understand the predictors of IAT *D*-Score. The principal components were used as predictors in a linear regression model. Additionally, tree-based models were used with principal components and other variables as predictors.

The IAT *D*-Score was regressed on three principal components, five Safety principal components, Education, and Cost. The process followed was a serial elimination of insignificant predictors that did not adversely affect the adjusted R^2. Sense of Achievement, Work Conditions, Perception of Policy, nSafety, nEquip, nComf, Unpredictability and Education were the predictors that were retained in the model. The model was significant, $R^2 = 0.47, R^2_{Adj} = 0.38, F (8, 51) = 5.65, p < 0.0001$. The predictor years of education, $\beta = 0.06, t (51) = 3.77, p < 0.0001$, was highly significant. Among the principal components, Sense of Achievement was a significant predictor, $\beta = 0.15, t (51) = 3.08, p < 0.01$. Among Safety PCs, nSafety, $\beta = -0.10, t (51) = -2.16, p < 0.05$, was a significant predictor.

5.4 Classification and Regression Trees

Several boosting algorithms have been developed in the area of machine learning to solve the classification and regression problem. A classification tree is used for target variables with discrete values and regression tree is used for target variable with continuous values. Classification and Regression Trees (CART) are useful as they improve predictability in non-linear datasets. A regression tree is developed in the present study with IAT *D*-score as a continuous target variable.

The classification process starts with a single group called as a 'root node' or 'parent node' of the tree. The group is split into two groups (child node) by a predictor variable that leads to highest reduction in the total variation of the dependent variable. There are various algorithms to make the splitting decision (e.g., Gini's criteria, reduction in Residual Sum of Squares, etc.). The process continues to the right or left sub-branch according to the splitting condition. The process stops as it reaches the terminal node (leaf) or if a predetermined criterion is reached. This process results in models that appear like trees. The R library 'rpart' was used to develop a tree-based model. The model has IAT *D*-score as a dependent and Sense of Achievement, Work Conditions, Perception of Policy, Education, and Cost, as its predictors. Four splits were developed with complexity parameter values being 0.25; 0.1; 0.05, and 0.01, the ratio of average deviance of the current tree and average deviance of null tree are 1.00, 0.75, 0.65, and 0.55 respectively. At the complexity parameter 0.01, the growth of the tree was stopped and the final retained predictors were Education, Sense of Achievement, Perception of Policy, and Cost. Figure 1 shows the tree.

The mean IAT *D*-score for entire data is 0.33. The mean is 0.4 for Education above 10th grade (Secondary School Certificate according to Indian education system) and if the Sense of Achievement is greater than 0.32, then the mean is 0.62. For the same group, if the Perception of Policy is smaller than 0.62, then the mean falls to 0.37 and it slightly improves to 0.47 if Cost is more than ₹ 2,836.
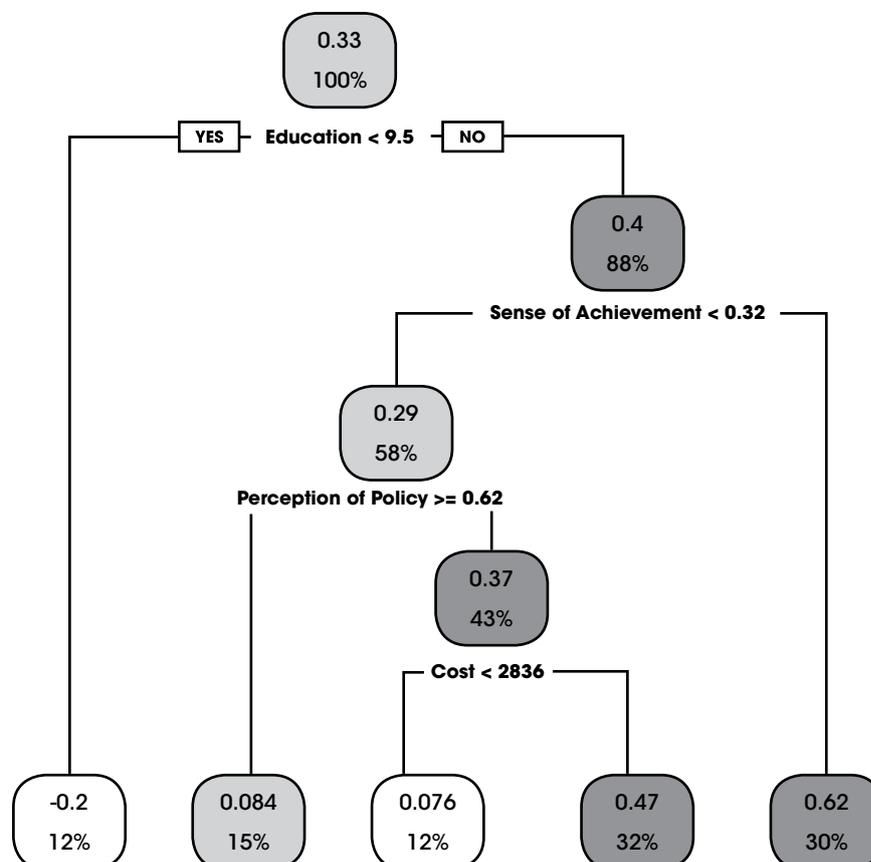

Figure 1: Regression Tree for predicting Forest IAT

A fitted functions plot of Boosted Regression Trees (see Figure 2), shows relative importance of the predictors. These plots are partial dependence function showing effect of each predicting variable on response variable, i.e., IAT *D*-score, after the average effect of other variables in the model are accounted for. These plots are useful for understanding effects of each variable, particularly in the absence of interactions among the predictors (Friedman, 2001; Friedman & Meulman, 2003). The predictors are principal components and hence are independent. The partial responses for IAT *D*-score for the six predictor variables indicate that above average values of Sense of Achievement and Work Condition, lower scores on perception of policy, increase in education up till 12th grade (Higher Secondary Certificate in the Indian education system) and then further up till 15th grade (Bachelor's degree in the Indian education system) increases IAT *D*-score. However, Cost has comparatively little impact on IAT *D*-score.
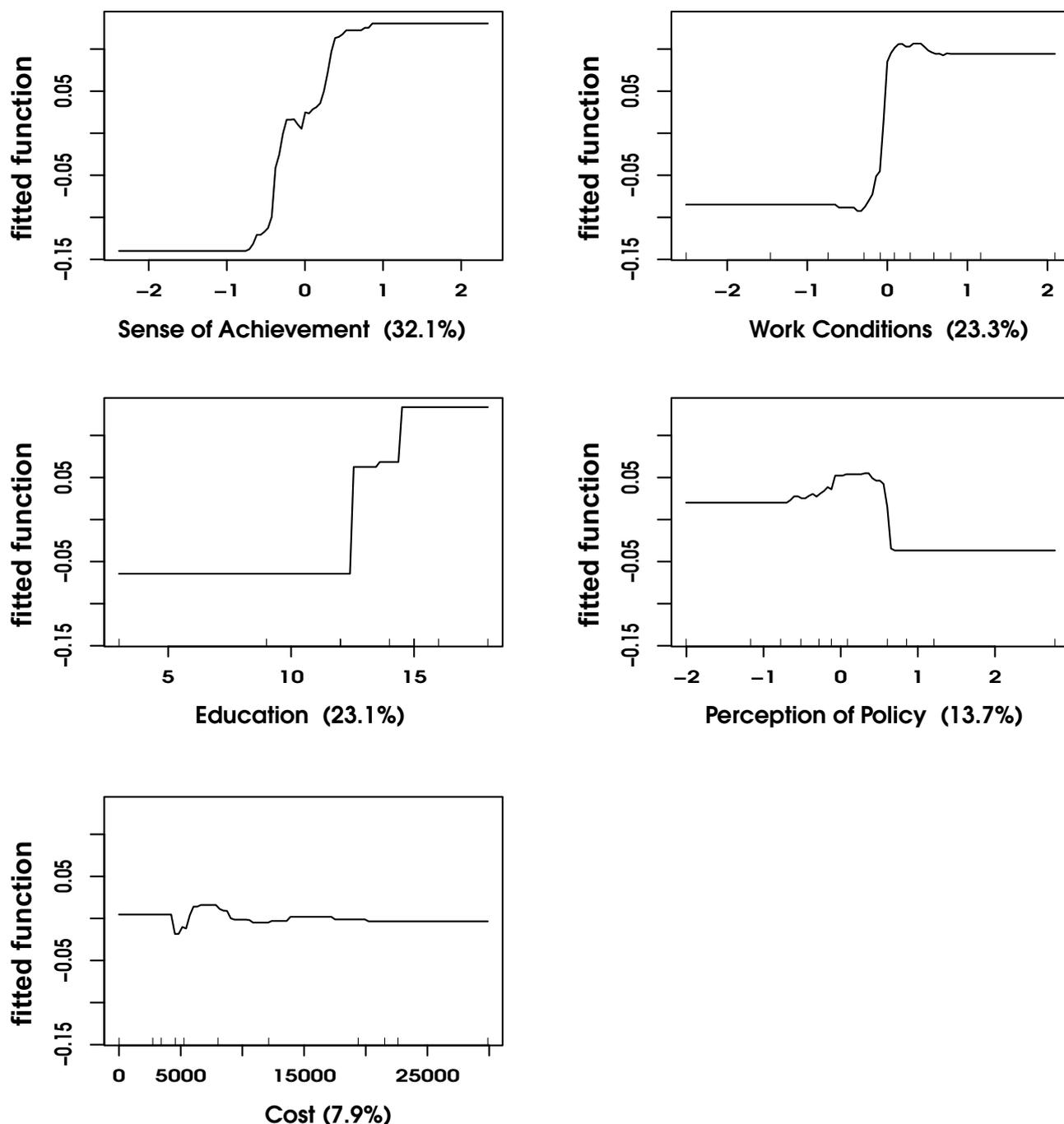

Figure 2: Relative Importance of the Variables in Predicting Motivation

6. LEARNINGS AND POLICY IMPLICATIONS

6.1 Learnings

The findings from the factor analysis of the data lead to three factors, namely Sense of Achievement, Work Conditions and Perception of Policy. Sense of Achievement and Work Condition contain aspects of 'motivators' and Perception of Policy has aspects of 'hygiene factors'. There is negative correlation of nSafety and Forest-IAT which indicates that Forest guards who are scared and worried about their safety in the forest have lower association with the forest. The need for safety and security is recognised as basic needs in motivation accounts, e.g. Hierarchy of needs (Maslow, 1968). Working in forests in India is potentially a high-risk job for various reasons including threat to limb and life from poachers; human-wildlife conflict; various other health hazards like malaria, typhoid and other water borne diseases; conflict with adjoining villagers over grazing and woodcutting, etc. making it necessary to work on safety of forest guards. 162 forest staff from India lost their lives in the line of duty between 2012 and 2017, which is at least three times higher than any other country ("Roll of Honour", 2018).

The negative relationship of Sense of Achievement and Unpredictability indicates that Unpredictability reduces as Sense of Achievement increases. For the current demographic pattern prevalent in India, age is negatively correlated with Education. Being a developing country, India's Gross Enrolment Ratio at every level of education is increasing and hence younger people are more educated than older people in any job ("Open Government Data (OGD) Platform India", 2018).

The findings of predictive analysis of *D*-Score on three principal components, five Safety principal components, and Education and Cost are theoretically consistent.

Education is an important predictor of the association with forest guards' immediate work environment. People with lower education are likely to take up any kind of job that comes their way, whereas more educated people choose among the options they have. Education also provides a reason for choosing a job. Hence, education appears to have a positive relationship with implicit
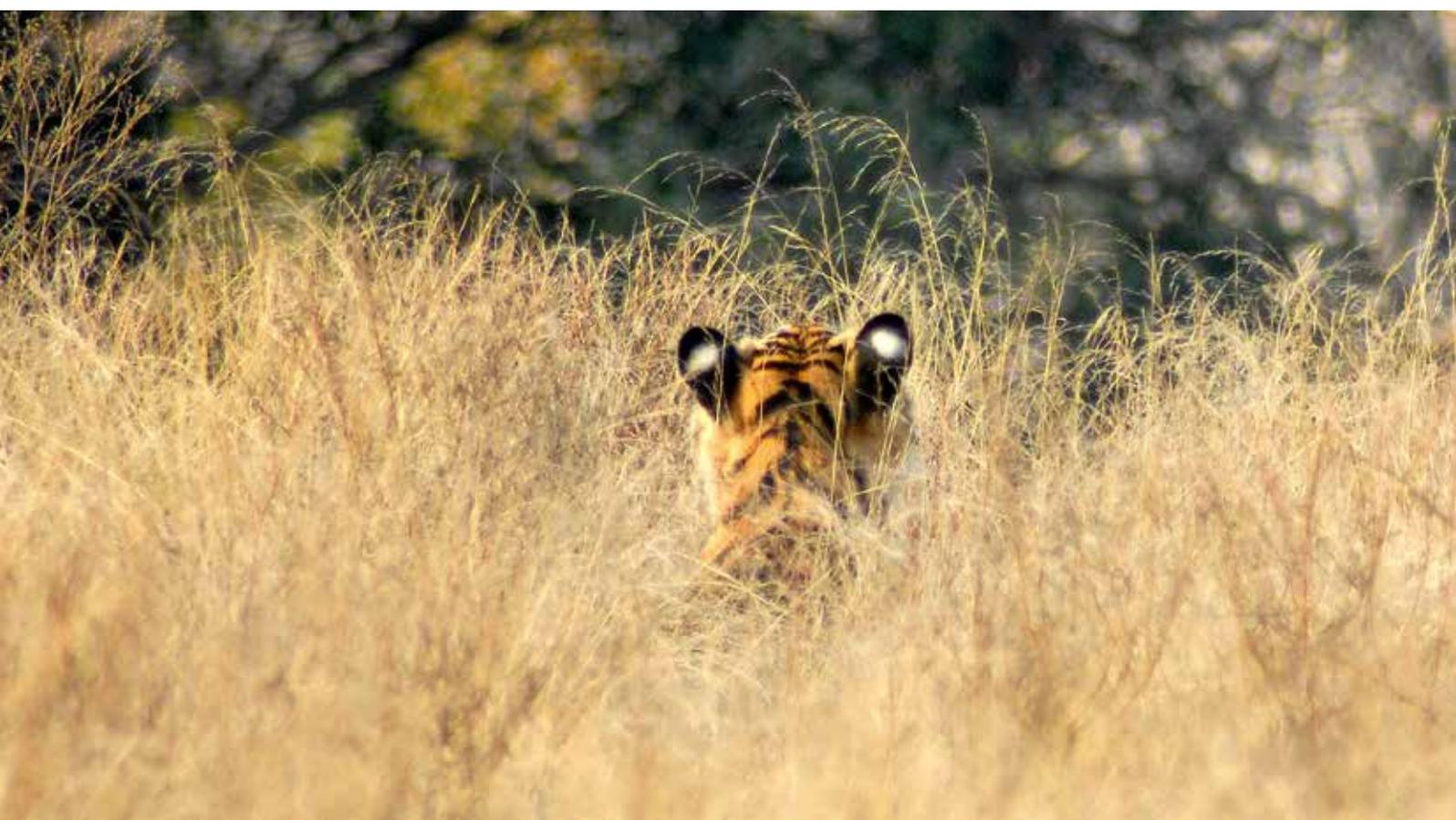
association with forest work. The regression tree provides more insights into the role of education. Results of the regression tree clearly predict that Education is the most important predictor, with education up to 10th grade being most critical. It is an important benchmark in the Indian education system, with 35.92% Gross Enrolment Ratio in India at senior secondary level ("Open Government Data (OGD) Platform India", 2018). The fitted function plots (see Figure 2) show upward discontinuity in the predictor function at 12 years or 15 years of formal education, which are the levels of high school and university graduation respectively.

The Sense of Achievement is an important predictor of IAT *D*-score. For forest guards having Education above 10th grade, the impact of sense of achievement is more pronounced. India being a highly collectivist culture (Hofstede, 1984), the sense of achievement is drawn from rewards in social recognition. The forest guards work with *vanamajur* and have an opportunity to direct them. They also have better employment status than *vanamajurs*; hence, a sense of achievement is obtained via downward comparison. In addition to it, sense of achievement is a function of social status associated with the job and feeling of accomplishment. Increment in these perceptions increases their association with forest. It clearly indicates that the forest guards having lower sense of achievement can improve on IAT *D*-score only if their perception of policies is better and sufficient functional equipment are available. At lower sense of achievement, it can be managed but not replaced by improving their perception of policies and material support.

In the tree-based model, low score on Perception of Policy and insufficiency of equipment, leads to poor score on Forest-IAT (mean IAT *D*-score = 0.076). The perception of policy is primarily a function of perception about pay, promotion, and facilities at work. The forest guards working in tiger reserves get the same salary and promotion opportunities as the forest guards not working in protected areas, whom they compare themselves with. The non-tiger reserve forest guards get to stay with their families and enjoy the life of a civilian. The tiger reserve forest guards do not get any such opportunities and normal life pleasures are a luxury for them. This also creates a sense of work-life imbalance (Kalliath & Brough, 2008) and a serious sense of dissatisfaction about the policies associated with pay and promotion at work.

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6.2 Policy Implications

The study sketched out a few data-based policy implications that are stated below:

1. **Increase sense of achievement among forest guards:** Training and job profiling should be designed and modified so that it creates more sense of achievement among forest guards. To begin with, the Field Directors at the park level can use their discretion and implement strategies mentioned below that improve sense of achievement, and subsequently, it can be incorporated in regular training and development activities. There is parity across all wings of Forest Departments in pay structures and opportunities of promotion. However, there is disparity in the work profiles of forest guards in different wings (Territorial, Social Forestry, FDC and Wildlife). The relative difference in work profile in the same cadre creates perceptions of disparity. For wildlife wing forest guards, this causes lower sense of achievement, since it leads to downward social comparison. Data suggests that lower sense of achievement associated with the field of work improves only through provision of functional equipment and higher pay. Ensuring awards or praise from supervisors to be accorded in a social setting or social gatherings in the presence of the community can also enhance their sense of achievement. Rope in media to create a high social status of forest guards such as paramilitary forces. We recommend that improving training, achievement-orientated job profiling, community-based rewards, opportunity to have social status and recognition, training of Range Forest Officers and Assistant Conservators of Forests in human resource management, and working on perceived disparity are some of the important areas to be tapped to improve sense of achievement.

2. **Improvements in human resource management:** It is important that the management of forest guards by their supervisors is improved. Things like decision-making competence of supervisors and following inclusive process of decision-making, allowing forest guards to use their own methods within the scope of their work, and use of feedback and praise are some strategies central to the supervisors. Rotation of assigned anti-poaching camps every few months may also help. This can be achieved through a training programme that incorporates findings of this study along with established human resource practices for Range Forest Officers and Assistant Conservator of Forests.

3. **Improve anti-poaching camp conditions:** Access to clean drinking water, equipment charging facilities and lights, and other basic amenities must be available and functional at all anti-poaching camps. There is a need to immediately replace dysfunctional equipment, especially the ones that provide basic amenities and basic safety. A tech-based solution for continuous need assessment and provision can be worked out.

4. **Safety:** Training forest guards in basic first aid, information about the surroundings, information about wildlife along with training that increases their perception of safety will help in the feeling of safety. The data suggests that the guards feel safe because of the equipment that are provided to them. The current condition of the anti-poaching camps needs to be improved from a safety perspective e.g. better fencing for safety etc.

5. **Psychological health:** Since forest guards work in isolated and demanding work conditions, an institutional mechanism needs to be put in place for periodic monitoring of their psychological health. This may include medical and counselling facilities. This will help in assessing their psychological health and ensure they get timely aid.

6. **Qualification of forest guards:** Minimum Higher Secondary Certificate (12th grade) as qualification leads to major improvement in work motivation and execution. Hence, the current criteria of HSC for forest guard recruitment should not be lowered.

7. **Financial incentives:** We recommend effort-based financial incentives for the forest guards. We strongly recommend that the government should institute a special wildlife allowance at least in tiger reserves.

8. **Promotion:** Data suggests that forest guards are dissatisfied with the promotions in their job this is reflected in the Perception of Policy factor. The advancement in jobs is an important factor for forest guards work performance. Sources of dissatisfaction about advancement in jobs needs to be further investigated.

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APPENDIX 1

Table 1: Factor pattern matrix for Minnesota Satisfaction Questionnaire.

Items	SoA	WC	PoP	h²
The chance to be "somebody" in the community	**0.54**	**-0.40**	-0.14	0.48
The way my job provides steady employment	**0.70**	-0.05	0.15	0.51
The chance to do things for other people	**0.61**	-0.15	-0.02	0.40
The chance to tell people what to do	**0.69**	0.09	-0.24	0.55
The way coworkers get along with each other	**0.30**	-0.03	0.20	0.13
The feeling of accomplishment I get from the job	**0.54**	-0.01	0.14	0.31
The chance of work alone on the job	0.13	**0.48**	0.21	0.29
The way my bosses handle their work/workers	-0.21	**0.42**	**-0.47**	0.44
The competence of my supervisors in making decisions	-0.12	**0.49**	**-0.38**	0.40
Being able to do things that don't go against my conscience	-0.12	**0.30**	0.04	0.11
The chance to do something that makes use of my abilities	-0.06	**0.55**	0.25	0.38
The freedom to use my own judgment	**0.44**	**0.57**	0.01	0.52
The chance to try my own methods to do the job	**0.34**	**0.65**	-0.16	0.56
The praise I get for doing a good job	-0.18	**0.62**	-0.08	0.43
Being able to keep busy all the time	0.19	0.12	**0.33**	0.16
The way government policies are put into practice	-0.03	-0.17	**0.70**	0.52
My pay and amount of work I do	0.03	0.08	**0.68**	0.47
The chance of Advancement in Job	-0.21	0.25	**0.65**	0.53
The chance to do different things time to time	-.04	.18	.00	.03
The work conditions	0.19	0.19	0.19	0.11

Note: loadings above value |0.30| are shown in bold face. Statements that are markers of factor are shown with bold face. SOA =Sense of Achievement; WC = Work condition; PoP = Perception of Policies. Extraction: Principal Components, Rotation: Varimax.

APPENDIX 2

Table 2: Factor pattern matrix for Safety items

Items	nSafety	nEquip	nComf	BBS	Unpre	h^2
I think that the work condition is safe	**-0.80**	0.18	0.24	0.21	-0.08	0.78
I often feel scared/ tense about the safety	**0.63**	-0.14	**0.55**	**-0.30**	-0.02	0.81
Attempts need to be made to make work conditions safe	**0.76**	0.20	-0.02	0.26	**0.35**	0.81
The equipment provided make the work condition safe	-0.26	**0.79**	**-0.32**	-0.01	0.02	0.80
Safety depends on equipment provided	0.13	**0.88**	0.16	0.09	0.04	0.84
Attempts need to be made to make work conditions comfortable	-0.18	-0.01	**0.89**	0.20	-0.01	0.86
The safety depends on our behaviour	-0.06	0.06	0.12	**0.93**	-0.18	0.91
Safety is unpredictable.	0.19	0.04	-0.01	-0.19	**0.94**	0.96

Note: n-Safety = Need for Safety; nEquip = need for equipment; nComf= Need for comfort; BBS= Behavior based Safety; Unpre = Unpredictability. Loading above |0.5| are in bold face. Extraction: Principal Components, Rotation: Varimax.

APPENDIX 3:

Forest Implicit Association Test (IAT):

A Forest-IAT was developed for this survey by Dr. Vivek Belhekar, Department of Applied Psychology, University of Mumbai. The IAT paradigm is developed for measuring association (Greenwald & ca, 1995) and individual differences in cognition (Greenwald et al., 1998). The IAT paradigm has been used for developing a Forest IAT which was built on Opensesame 3.1 (Mathôt et al., 2012). The technique of improved scoring algorithm (Greenwald et al., 2003) was used to obtain D-score, which is a standard normal random variable.

The IAT has been presented on a computer. Typically, an IAT consists of seven tasks. The same has been adapted for Forest IAT. There were twelve pictures that were classified into 'wildlife', 'domestic', 'happy', and 'sad' categories. The participant has to rapidly classify object(s) into categories by pressing either 'Z' or 'M' key. The first task involved classifying 'wildlife' and 'domestic' images into respective categories. The second task involved classifying images of 'happy' and 'sad' faces into respective categories. The third and fourth tasks involved pressing 'Z' key if image is either 'happy' or 'wildlife' and pressing 'M' if image is either 'domestic' or 'sad'. In the fifth task 'wildlife' and 'domestic' images were switched to 'M' key and 'Z' key, respectively. The sixth and seventh task involved pressing 'Z' key if the image is 'domestic' or 'happy' and 'M' key if image is 'wildlife' or 'unhappy'. The D-Score obtained on Forest IAT has been used as a dependent variable in the analyses.

APPENDIX 4:

Report of Factor Analysis

Factor Analysis of Minnesota Satisfaction Questionnaire: The 20-items of Minnesota Satisfaction Questionnaire were subjected to factor analysis. Though the Kaiser-Meyer-Olkin (KMO) factor adequacy was 0.49 for the sample of the size 60, the Bartlett's test of sphericity was highly significant ($\chi^2 = 333.59$; $df = 190$; $p< .0001$) indicating that the population correlation matrix departed from the identity matrix. Though, factor analysis has been traditionally applied on large samples, in recent years, authors have recommended its application for really small sample sizes (e.g., de Winter et al., 2009; Sapnas & Zeller, 2002). The first ten eigenvalues were 2.68, 2.47, 2.17, 1.68, 1.55, 1.46, 1.25, 1.06, 0.97 and 0.81. Three principal components explained 37% variance. The three factors were rotated on varimax criterion, were labeled as Sense of Achievement; Work condition; Perception of Policies and the factor pattern matrix is reported in Appendix 1.

Factor Analysis of Sense of Achievement: An eight-item safety questionnaire was subjected to the principal components analysis and five principal components explaining 85% variance were retained and rotated against varimax criterion. The eigenvalues were 2.20, 1.63, 1.39, 0.89, 0.66, 0.46, 0.40 and 0.36. Table 2 reports the rotated factor pattern matrix. These PCs were used as variables in further analysis.

The PC were labeled as follows: PC1 as need for Safety (nSafety); PC2 as self-defense equipment leading to a sense of safety (nEquip); PC3 as need for comfort (nComf); PC4 as belief that safety depends on behaviour (BBS); and PC5 as unpredictability of safety in forest (Unpredictability). The noteworthy point is that feeling of fear about safety is positively associated with need for safety and need for comfort which implies that this item is assessing aspects of stable personality trait of neuroticism (Tackett & Lahey, 2016).

ANNEXURE 1:

Forest Administration in India

1.1 Administrative classification of forests.

Under Section 100 of the Schedule VII of The Government of India Act, 1935, the subject of forests was included for the first time and was under the control of the Agriculture and Forest Department. Further, in the 42nd Amendment to the Constitution of India, forests have been included in the concurrent list in 1976. The forests are now a subject matter of the Ministry of Environment, Forests and Climate Change (MoEF&CC) in the Government of India. Under The Wild Life (Protection) Act, 1972, about 869 protected areas have been declared. These include national parks, sanctuaries, conservation reserve and community reserve. PAs are regions that have been set aside for conservation of biodiversity and ecosystems. In 1973, Project Tiger was launched for conservation of tigers. It is an ongoing Centrally Sponsored Scheme of the MoEF&CC providing central assistance to the tiger states for tiger conservation in PAs designated as tiger reserves. The management of these tiger reserves is carried out by the State Governments. The National Tiger Conservation Authority (NTCA), which acts as a statutory body of the MoEF&CC, with an overarching supervisory as well as coordinating agency, performs functions as mandated in The Wild Life (Protection) Act, 1972.

1.2 Center–State relationship with reference to management of tiger reserves.

Protection of tiger and tiger landscapes is the responsibility of the states. These states are supposed to prepare tiger conservation plan for each tiger reserve within the state; ensure enforcement of law; delineate critical tiger habitat and buffer zones; provide staff for tiger conservation; regulate and manage tourism; monitor tiger populations; and properly utilise funds from the Centre. The NTCA provides assistance to States for activities such as protection, habitat improvement, day to day monitoring, eco-development for local people in buffer areas, voluntary relocation of people from core/critical tiger habitats, and addressing human-wildlife conflicts. One of the key objectives of the NTCA is to foster accountability of states to the Center in the management of tiger reserves.

1.3 Organisational structure of state forest department.

The descending administrative hierarchy of Forest Department has Principal Chief Conservator of Forests (PCCF), Additional PCCF, Chief Conservator of Forests (CCF), Conservator of Forests (CF), Deputy CF, Assistant CF, Range Forest Officer (RFO), Round Officer, and Forest Guard (FG).

Tiger Reserves are headed by the CCF holding the position of Field Director. Field Director is assisted by the Deputy Director(s) and Assistant CF(s). On field, every forest range, which is an administrative unit, is managed by the RFO. The RFO has a team of Foresters, Deputy Foresters and forest guards. These make the on-ground forest officers.

ABOUT WCT

Using the Tiger as a metaphor for all of nature, Wildlife Conservation Trust (WCT) was envisioned to preserve and protect India's rich natural heritage. Currently, WCT works in and around 160 Protected Areas across 23 states in the country covering 82% of India's 50 tiger reserves, 21% of the 769 Protected Areas and impacting a population base of approximately 3.5 million people. WCT works towards the mitigation of anthropogenic pressures through a robust and tested 360 degree approach with a firm belief in landscape-level conservation of both wildlife and their habitats, sustainably factoring in the needs of people dependent on these forests.

![Wildlife Conservation Trust logo]

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