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PHOTO PROVIDED BY NAVEEN PANDEY

# Enhanced Welfare of Asian Elephants and Rice Cultivators by Altering Traditional Crop-guarding around Kaziranga National Park, Assam, India

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## Abstract

India is home to nearly 60% of all Asian elephants (*Elephas maximus*). It accords the highest possible legal protection by listing elephants under Schedule I of India's Wildlife (Protection) Act, 1972. Assam, a state in northeast India, has one of the highest populations of free-roaming elephants. Assam recorded 249 elephant deaths from 2010 to 2018; these were due to electrocution (92), train collision (54), accidental causes (38), poisoning (30), poaching (20), and injury (15). The mortality of humans stands at 812 during the last decade. Human–elephant conflict is a complex process affecting the socio-economic life of rural communities worldwide and the welfare of wild elephants. Based on a study of crop-raiding patterns from lookout-points (*tongi*) in rice fields in the fringe villages of Kaziranga National Park, Assam, India, this paper records changes in the social life of rural folks when *tongi* were strategically placed and equipped with powerful torchlights. Farmers enjoyed a more prosperous social life, saving one-third of their time due to a roster in crop-guarding to educate their children. Two-thirds of the saved time was consumed for socialization and recreation. The frequency of close confrontation with elephants during crop guarding declined by 75%, and enhanced welfare of elephants and humans is likely to occur.

## Introduction

India has c. 60% of the total global population of Asian elephants (*Elephas maximus*). In contrast, it ranks third in wildland areas for elephants after Myanmar and Thailand (Leimgruber *et al.*, 2003). Elephants had almost continuous distribution in northeast India, including Bhutan, Nepal, Myanmar, and Bangladesh (Choudhury, 1999). Assam is a prime conservation area for elephants (Choudhury, 1999). Habitat loss, habitat fragmentation, and changing land-use patterns have intensified the human–elephant conflict (HEC) situation in India (Sukumar, 2006) that affects nearly half a million families in India every year (Rangarajan *et al.*, 2010). The conflict has also resulted in the death of 249 elephants in Assam in the last decade. Electrocution, collision with trains, poisoning, poaching, and injuries are reasons for elephants' unnatural deaths. Most of the conflict occurs in agricultural fields in the form of crop-raiding when farmers and elephants compete for resources in rice fields. The impact of the conflict is said to affect the socio-economic well-being of the farmers. However, there is not much literature assessing the effects of this conflict on elephant welfare.

## Study Area

The project covered 36 villages of the Kaziranga-Karbi Anglong Landscape in northeast India (Figure 1). Kaziranga National Park (KNP), a world heritage site, is located in Assam, a state in the northeastern region of India and refers to a vast forest area spreading across five districts: Golaghat, Nagaon, Karbi-Anglong, Biswanath Chariyali, and Sonitpur. It is home to two-thirds of the world's one-horned rhinoceros' (*Rhinoceros unicornis*) population and over a thousand Asian elephants, and it hosts a wide range of mammalian and avian diversity. KNP is part of Kaziranga Karbi Anglong Elephant Reserve (KKER) with an area of over 3,270 km<sup>2</sup> used by nearly 2,000 elephants. It is connected to two other important elephant

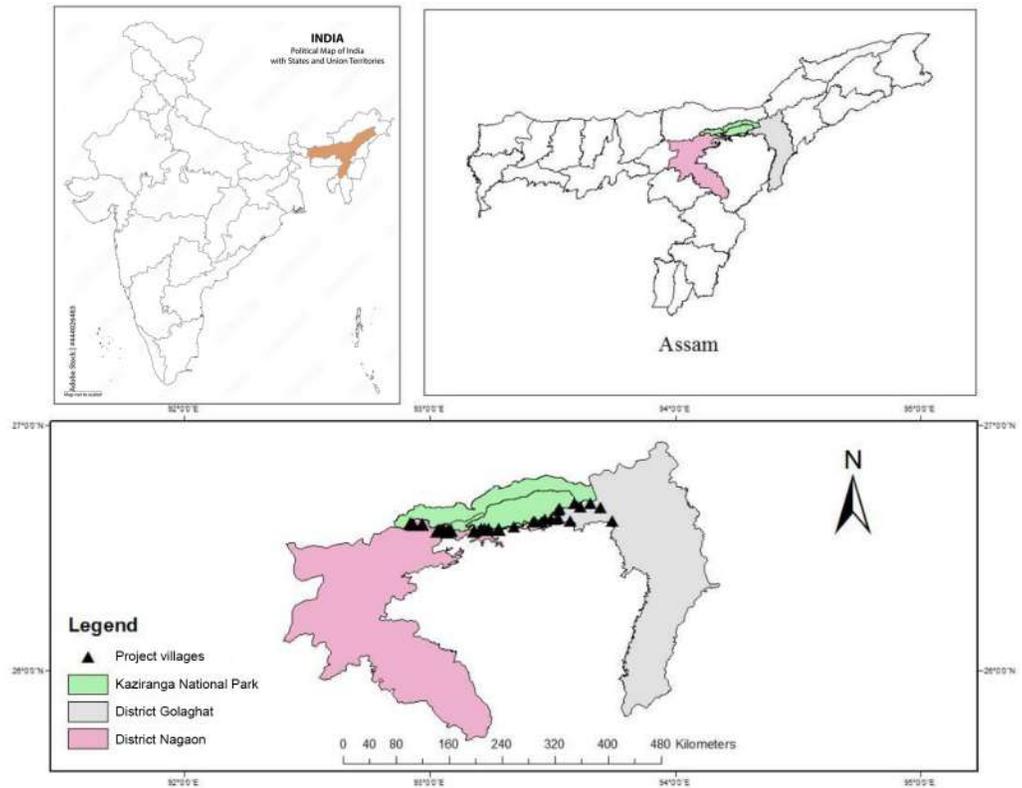
reserves, namely Dhansiri-Lungding (Assam) and Intanki (Nagaland), combinedly covering around 3,000 km<sup>2</sup>. There are no villages inside KNP, but the park's southern boundary is dotted with villages outside the park. In the Golaghat district's 18 village panchayats that have proximity to the park or the Tiger Reserve, there are nearly 130 villages with a human population of 170,771. Nagaon district's 10 village panchayats that could be considered close to the park or the Tiger Reserve have 105 villages with 120,257 human population. These two combined have 235 villages with a combined population of 291,028 (statistics from the Government of India). Rice and lentil cultivation, backyard vegetables, livestock rearing, fishing, and tourism-related businesses are the primary sources of income for the local community.

## Objective

The short-term goal was to reduce HEC, engaging the community in effective crop-guarding. The project aimed to improve the welfare of wild elephants by replacing sharp tools with torchlights and strategic placement of lookout points. The long-term goal is to promote the model at the landscape level after studying its socio-economic benefits and support Asian elephant conservation efforts in the region.

## Methodology

The traditional tools for human–elephant conflict mitigation in 36 villages of Kaziranga-Karbi Anglong Landscape in northeast India were studied. The risks involved in the traditional methods were identified. A network of 1,341 families was achieved by establishing 290 modified lookout points (locally called *tongi*). Lookout points are small hut-like structures made of locally available bamboo and often placed in agricultural fields. Seasonal movements of elephants—existing corridors as defined by the National Park Authority—and observations of the local



**FIGURE 1**  
Map of the Kaziranga-Karbi Anglong Landscape in Assam in northeast India. The 36 villages included in this project are marked in the bottom panel with black triangles.

people were taken into account for strategic placement of the lookout points. A committee of villagers and the village headman was formed in each village for coordinating crop-guarding exercises.

Each lookout point was designed for use by five to ten families. The traditional lookout point could not accommodate multiple families due to size (around 6 ft by 4 ft), and crop-guarding remained an individual's efforts in their own farm. Once modified, it could accommodate up to 10 families, and crop-guarding was a community effort (Figure 2). A roster system for attending night duty for crop protection was established to allow each family to get rest and family time every week. In the traditional method, every family handled the lookout point every day throughout the crop period.

The modified method emphasized stopping the conventional source of light and fire (locally called *bhota*) that used engine oil. All the lookout points were equipped with a powerful rechargeable torchlight that could throw its beam up to 2 km and help the farmers avoid close confrontation with elephants. The two traditional handheld tools, *shel* (a long and pointed iron bar fixed on a long pole) and *deeghal da* (a curved and sharp metallic end to a bamboo rod), were compulsorily abandoned for the farmers to be a part of the modified method. The two sharp objects were reportedly used as a last resort when the elephants were threateningly within close distance. Their use could compromise the welfare of the elephants and risked the

lives of the people. The project encouraged the use of mobile phones as a tool of communication for better coordination. The traditional tool used for communication was through the burning of old truck-tires that depended on availability and season.

Aimed to mobilize the community to adopt elephant-friendly tools and reduce the risks involved in crop-guarding for the agriculturalists, 1,160 village-level cluster meetings were organized between 2016 and 2021 in 36 villages. Such meetings were also designed to raise awareness for elephant conservation. The impact of the modified crop-guarding tool was assessed through field visits and semi-structured interviews of 340 farmers engaged in the project. Effort was made to understand how the villagers rationed their time saved from roster duty and whether they invested their additional income generated through efficient crop guarding in adopting improvised agricultural practices.

## Results and Discussion

The cultivators of rice crops in the project area used traditional deterrents like shouting, drum beating, bursting firecrackers, setting fire using old tires and jute bags. The presence of sharp tools like *deeghal da*, *shel*, and *bolem* was common in the *tongi* that farmers made in their rice fields to station themselves at night. Most of the farmers spent each night of their cropping season guarding crops every night. The probability of encountering elephants was



FIGURE 2

A tongi (lookout point) in construction (LEFT) and finished (RIGHT), used to watch for elephants raiding crops at night. Photos provided by Naveen Pandey.

quite high. The use of the traditional tools made the elephants and farmers vulnerable to injury. In the absence of powerful torchlights, the detection of approaching elephants was not very efficient. No early warning system was recorded to be practiced by farmers in the project area. Three-fourths of the respondents depended on hearing the herds' movement as a signal for approaching elephants. 68% of the respondents in the survey reported having been charged by elephants during crop-guarding.

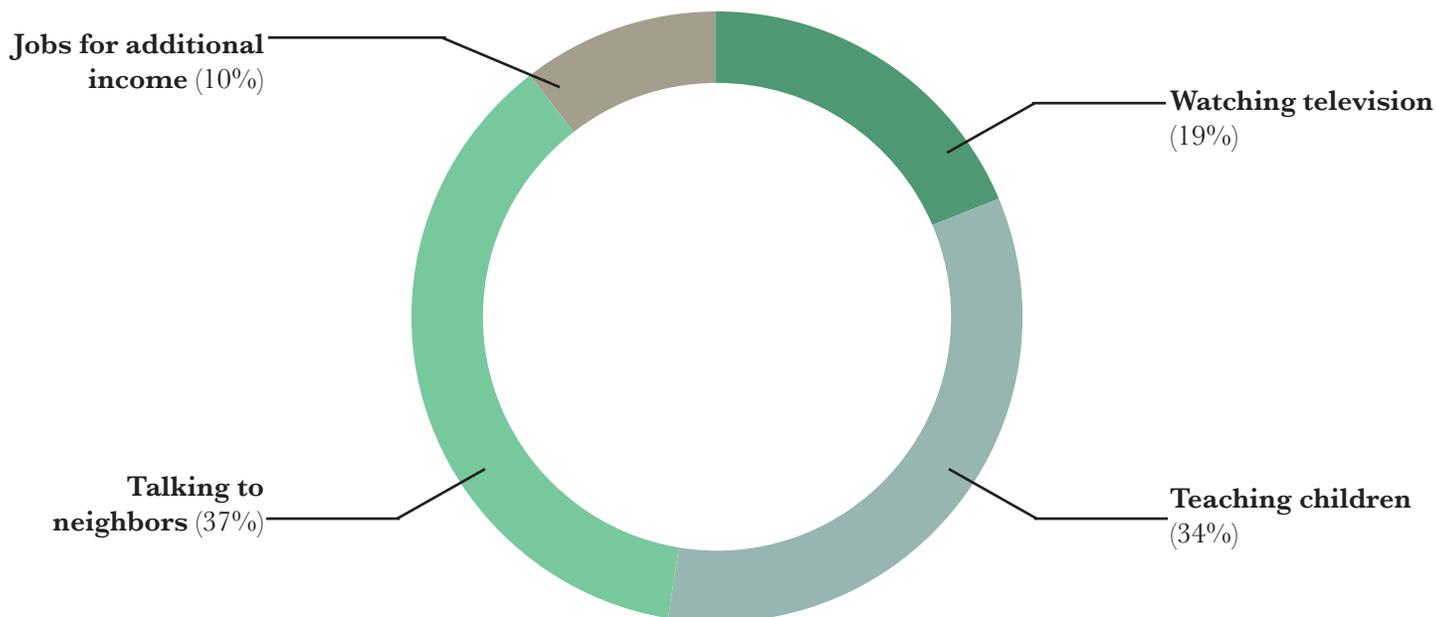
The main changes incorporated in the traditional method was making the *tongi* bigger, making crop-guarding a community effort, equipping them with powerful torchlights, and introducing a roster for crop-guarding at the family level. The community was involved from the first step of conceiving the project. For making lookout points, the community contributed labor and bamboo. This ensured a sense of belongingness for the project within the community. Many of the interventions in the past suffered because of poor engagement of the community in the project.

As the project lookout points had been aligned with wildlife movement patterns, they provided better protection of crops as the farmers could detect the crop-raiding animals before entering the crop field. Replacing motor-oil-based fire lighting tools (*bhuta*) with rechargeable torchlights doubled the success of farmers in stopping the elephants before they entered in fields and halved the time taken to force elephants to retreat if they entered the rice fields. The total area of crop protected under the project in the study area was 2,537 acres using 290 lookout points that engaged 1,341 families. As a result, farmers report-

ed around a 40% increase in their annual crop harvest and a reduction in the number of close encounters with elephants. All the beneficiaries found the modified lookout points and torchlights to be more efficient in deterring elephants and other crop-raiding megaherbivores such as one-horned rhinoceros and wild buffaloes (*Bubalus arnee*) from a considerable distance. During rice cultivation, at the initial stage, elephants tended to raid the nursery sites. Later, elephant raids became more intense as soon as the milking stage of rice sets in at the plantation site. Therefore, the lookout points provided adequate crop protection in both nurseries and fields.

The community and the research team assessed the total value of the crops protected annually in 36 villages belonging to 1,341 families. It stood at 432,000 USD with 290 functional lookout points, whereas the value of the produce harvested earlier averaged 309,000 USD. This estimate is only for a single crop cycle. The lookout points and torches are being used to protect crops in multiple cycles in a year, thus in reality, the value of crop protection is much higher than estimated.

The roster crop-guarding schedule implemented through the project allowed the farmers to take a few nights off. As a result, farmers enjoyed more prosperous social lives with additional time at hand (Figure 3). The changed time-use pattern indicated that nearly one-third of the saved time was dedicated to educating their children, and two-thirds of the saved time was consumed for socialization and recreation. With better returns from protected crops, farmers reinvested part of their income in improved farm machinery. They attribute these changes



**FIGURE 3**  
Responses of farmers when asked what activities they are doing now that they do not spend each night guarding their crops.

to their reduced fear of conflict and improved tolerance for wildlife. There is a gradual shift in the perception of elephants. No seriously close encounters with elephants were reported, and no injury to elephants or human beings was reported during the project period in the study area.

### Conclusion and Recommendation

Rapid loss of forest cover, encroachment of the forest by tea gardens, pending land audit, safety measures on railway tracks and poor supervision of power cables all need immediate action. Yet, while agencies refine their legal enforcement tactics and pressure groups lobby for accelerating legal protection, there is a great scope for sustainable action to relieve the pain and suffering of elephants and improvise socio-economic conditions of agriculturists. The alarmingly high casualty figures of elephants and humans will come down if communication, awareness, and grassroots level projects are undertaken in collaboration with the local community. Modifying traditional mitigation tools carries inherent acceptability, high adoption probability, and it is often cost effective. The wisdom of generations of agricultural communities should be incorporated in designing human-wildlife conflict mitigation measures. The success stories and lessons learned should be incorporated in suitable educational materials in vernacular languages.

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