Status and Distribution of Asian Elephants in the Nagaon Forest Division, Assam, India

Jyoti Bikash Baishya[1], Nazimur Rahman Talukdar[1,2], Parthankar Choudhury[1]*

[1]*Wildlife Conservation Research Centre, Department of Ecology and Environmental Science, Assam University, Silchar, Assam, India*
[2]*Centre for Biodiversity and Climate Change Research, Udhayan, Hailakandi, Assam, India*
**Corresponding author's e-mail: parthankar@rediffmail.com*

Introduction

The Asian elephant is distributed across 13 range countries with a population of about 41,000 to 52,000 (Sukumar 2006; Williams *et al*. 2020). The mainland subspecies *Elephas maximus indicus* has the highest number of individuals and is mainly found in India. The government conducted a synchronized elephant census throughout India in 2017 and found 27,000–29,000 elephants distributed in 23 states (MoEFCC 2017).

The state of Assam with around 5700 elephants is a key conservation area for Asian elephants in India (MoEFCC 2017). The forested area in the state is 26,832 km^2, which is 34.2% of its geographical area (DEF 2020). Of the forests, 14.9% is under National Parks and Wildlife Sanctuaries while the remaining 85.1% are unprotected. These unprotected forests are inhabited by many wildlife species, including elephants. Assam is divided into 34 Forest Divisions.

The present study evaluates the perceived status and distribution of elephants and migratory corridors in Reserve Forests (RF) in the Nagaon Forest Division.

Materials and methods

Study area

The Nagaon Forest Division is situated in the Brahmaputra valley, encompassing the forest areas of Nagaon, Hojai and Morigaon Districts of Assam. The Nagaon Forest Division is composed of the Northern, Western, Kathiatoli and Kampur Ranges (Fig. 1). The topography of the area consists mostly of plains with hilly terrain in the east, northeast and southeast. Forests cover 1085.37 km^2, which is 19.7% of the total area and comprise of 60 km^2 very dense forest, 405 km^2 of moderately dense forest and 620.37 km^2 of open forests (FSI 2019). The plains areas are composed of agricultural lands, marshy lands and swampy areas.

The climate is tropical with the three seasons; summer (March to May), monsoon (June to October) and winter (November to February). Like in other parts of India, summer season also coincides with the monsoon. The highest rainfall is in June and the driest month is January. The area receives around 2400 mm annual rainfall. The annual average temperature is 10–26.5°C with high humidity. There are approximately 176 villages within the Nagaon Forest Division. Human-elephant conflict (HEC) has become common in the area in the last few decades.

Data collection

Forest villages were visited between April 2018 and December 2019 and those with conflict identified. From each of 17 HEC affected villages, 8–13 older persons (aged 60 years and above) were interviewed (Fig. 2). Interviews were conducted in the vernacular. Respondents were asked about migratory corridors, and if there have been any changes over the decades.

The information thus gathered was discussed with Forest Department and people involved in Green Guard Nature Organization (a local NGO

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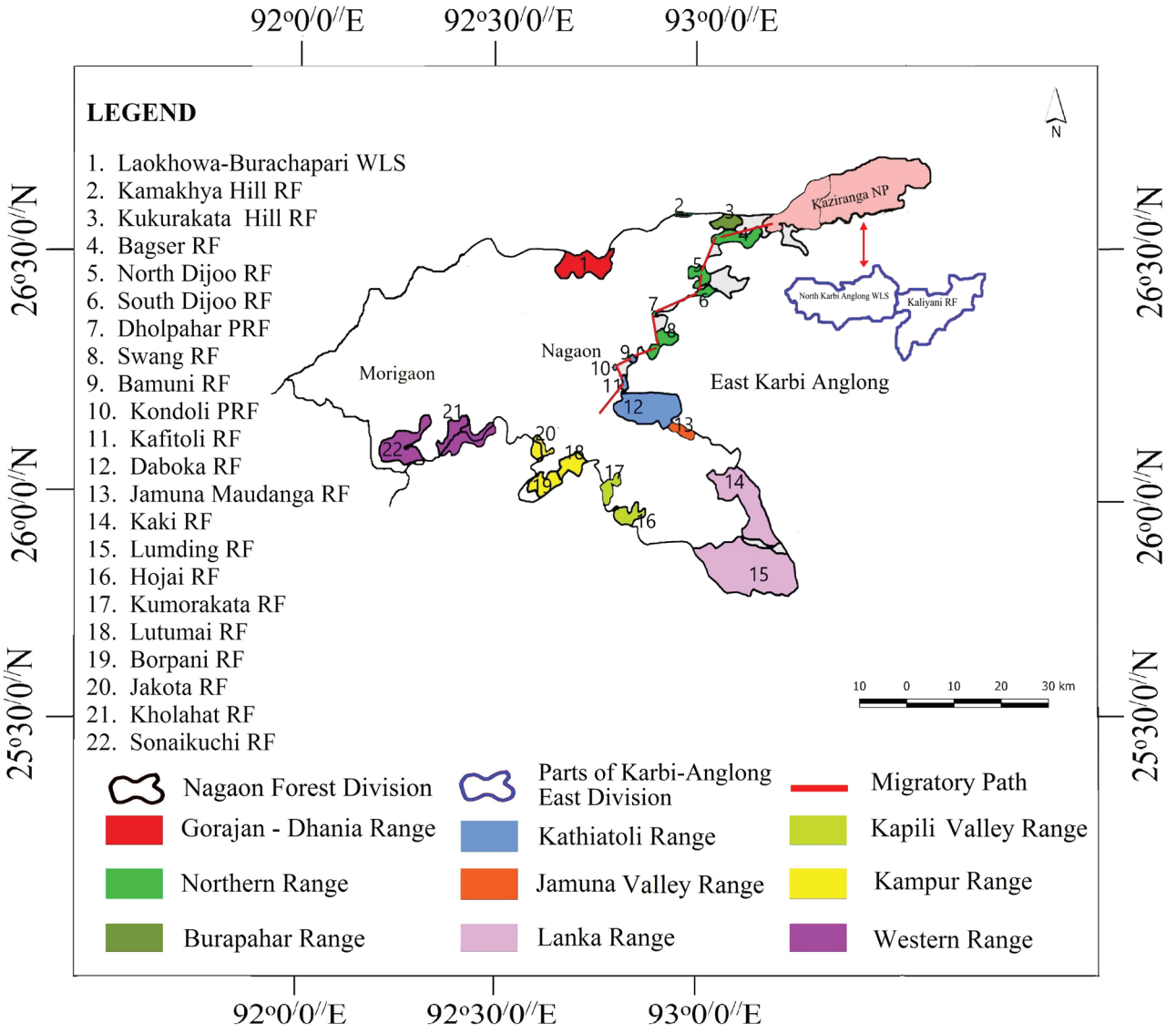

Figure 1. Map of the Nagaon Forest Division showing the reserve forests and protected areas and assumed migratory path of elephants in the Nagaon Forest Division. (RF = Reserve Forest, PRF = Proposed Reserve Forest, WLS = Wildlife Sanctuary).

working to mitigate HEC). Information such as the map of the divisional boundary, area of forest ranges and reserve forests and data on government elephant census in 2010 and 2017 were obtained from the Nagaon Forest Divisional Office.

Results

Elephant numbers

Census data indicates that the elephant population in the Nagaon Forest Division decreased from 140 in 2010 to 79 in 2017. Change in numbers in the specific ranges were 56 to 28 in Northern, 23 to 22 in Western, 21 to zero in Kathiatoli, 34 to 17 in Kampur Range and 2 to zero in Dhania Range while it increased in Gorajan Range from 4 to 12 (Fig. 3).

Elephant movement

Nagaon District is bounded in the south by the West Karbi Anglong and North Cachar Hills and in the east by the East Karbi Anglong and Golaghat districts. These areas are contiguous with the Kaziranga-Karbi Anglong Elephant Reserve. Large numbers of elephants are said to migrate through this corridor to different areas of Nagaon District every year. During the paddy harvesting period (October to December), elephant herds

Figure 2. Interview with the local people at Chapanola, Nagaon (Assam).

are often present in the foothills of the Nagaon District, especially in the areas bordering the Kaziranga-Karbi Anglong Elephant Reserve.

During the survey, presence of elephants was ascertained based on direct sighting and presence of evidence such as elephant trails, dung and footprints. GPS coordinates of the locations indicating elephant presence were recorded in the field and a total of 347 GPS locations were collected. Movements of elephants were ascertained based on the experience of the forest staff dealing with deterring elephants from agriculture fields. Thus, the corridor was identified based on winter crop-raiding which is contiguous from Kaziranga to Nagaon District, covering a distance of 78 km. Most of the elephant herds are thought to migrate from Kaziranga to Swang RF and up to Kathiatoli and Kampur via the Kondoli proposed RF of Nagaon District and return to Kaziranga-Karbi Anglong Elephant Reserve (Fig. 1).

Discussion

The elephant population in the Nagaon Forest Division has reduced drastically in the past decade. Elephant numbers in Northern and Kampur ranges have reduced to half of what was present in 2010. Both these ranges face multiple threats. Large areas of the two ranges have been encroached and replaced by rubber plantations and croplands. Expansion of tea gardens is also a major factor, especially in the Borapani RF of the Kampur Range. The area of tea gardens is not monitored periodically and consequently gradual expansion occurs into forest areas. Constructions of roads and stone mining have also increased in the two ranges. Additionally, in the Northern Range, the foothills of RFs are covered by invasive alien plant species such as *Lantana camara* and *Chromolaena odorata* resulting in decrease of native food plants and grassland habitats.

No elephants were found in Kathiatoli Range in the 2017 census. During our fieldwork in the range no evidence of elephant presence was observed, confirming the 2017 census result. The elephants that were there may have either shifted their range or may have been lost. The main threats in the Kathiatoli Range are timber logging, extensive mining of stone and newly constructed roads.

The only stable population of elephants in the Nagaon Forest division was in the Western Range. The elephants mainly occupy the Kholahat RF and Sonaikuchi RF there. The Western Range is contiguous with the west Karbi-Anglong district habitats and does not face the same threats as the others. It is less disturbed as human presence and activities are lower compared to the other ranges.

Increase of human population is a major challenge in maintaining forests. The human population density in the combined Nagaon and Hojai districts were 582 people/km^2 in 2001 and 711 people/km^2 in 2011 (Census of India 2011). Forests in the Nagaon Forest Division continue

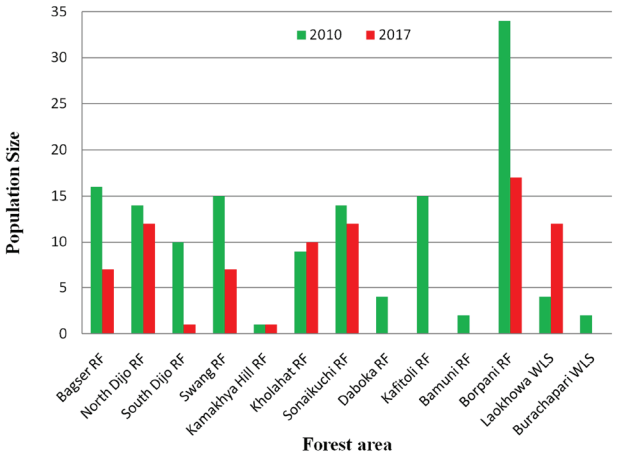

Figure 3. Number of elephants in the Nagaon Forest Division.

to be transformed into agriculture, tea and rubber plantations, human settlements and infrastructure as a result of this.

The assumed elephant corridor between Kaziranga National Park and Kathitoli RF is 78 km in length (Fig. 1). The previously continuous forest from Kaziranga to Karbi Anglong has declined over the last three decades due to increased human activity. Now the tract is heavily fragmented and consists of interspersed patches of forest and human-use land. Elephants have to move through human-use areas to go from one forest patch to another. Rain fed paddy is the main crop cultivated in the human-use areas and matures in November–December. Consequently HEC in the area is very common, especially in the winter when elephant numbers increase, making it difficult for farmers to harvest crops (Fig. 4). Cultivation is mostly by subsistence farmers and it is difficult for them to tolerate losses due to HEC. Therefore, conserving the extant forest patches and re-foresting so that they are once again connected is important to mitigate HEC.

Many forest areas in Assam are losing elephant habitats because of immense anthropogenic pressures on them (Das *et al*. 2012; Talukdar & Choudhury 2017). Similar to Assam only a fraction of the forests in India are protected. A major percentage of elephant habitats are in disturbed, unprotected and fragmented areas (MoEFCC 2017). Elephants in such areas are most vulnerable. Therefore, important unprotected habitats need to be identified and elevated to protected areas. In the Nagaon Forest Division elevating the status of the Western Forest Range into a protected area would be advisable.

Figure 4. Elephant herd approaching to the crop-field in Balijuri, Nagaon (Assam).

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