

## Elephant Mortality on Railway Tracks of Northern West Bengal, India

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### Introduction

Asian elephant (*Elephas maximus*) deaths due to train accidents are not unusual in some range states of India. During 1987–2007, 150 elephants died due to train hits across India, of which 36% of incidents occurred in Assam, 26% in West Bengal, 14% in Uttarakhand, 10% in Jharkhand, 6% in Tamil Nadu, 3% in Uttar Pradesh, 3% in Kerala and 2% in Orissa (Rangarajan *et al.* 2010). There has been an increase of Elephant Train Collisions (ETC) since 2007 in West Bengal.

The elephants of North West Bengal (NWB) represent the western-most extension of the northeast Indian subpopulation of elephants. The total extent of NWB is 7050 km<sup>2</sup>, of which 3051 km<sup>2</sup> is forested. Elephant habitat is confined to about 2200 km<sup>2</sup>. There are 529–550 elephants in this region comprising approximately 1.8%

of elephants in India (Anon. 2014). Elephants in NWB occur in the districts of Darjeeling, Jalpaiguri, Alipurduar and Cooch Behar. NWB is considered a hotspot of human-elephant conflict, attributable to unplanned settlements, tea gardens, farmlands, defence establishments, encroachment of elephant habitat and expansion of linear infrastructure such as roads and railways. Almost 50% of the elephant habitat in NWB comprises of non-conservation areas.

This study assessed ETCs on the Siliguri-Alipurduar railway track in NWB.

### Methods

The study was conducted across the zone of elephant distribution in NWB (Fig. 1) and was based on primary and secondary data obtained directly from the field, sites of incidents,

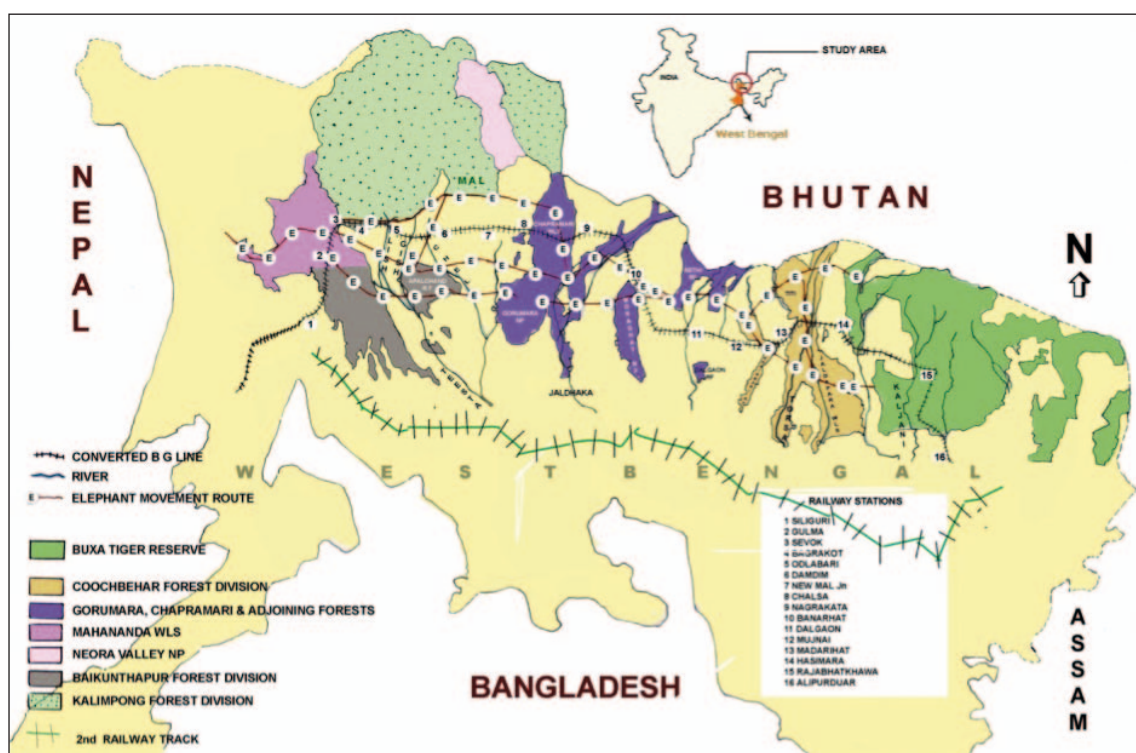


Figure 1. Study area in northern West Bengal.

information collected from the local community and official records of the Forest and Railway departments. Age-sex classes of the elephants were determined following Varma *et al.* (2012).

## Results and discussion

### *Alignment of railway track in NWB*

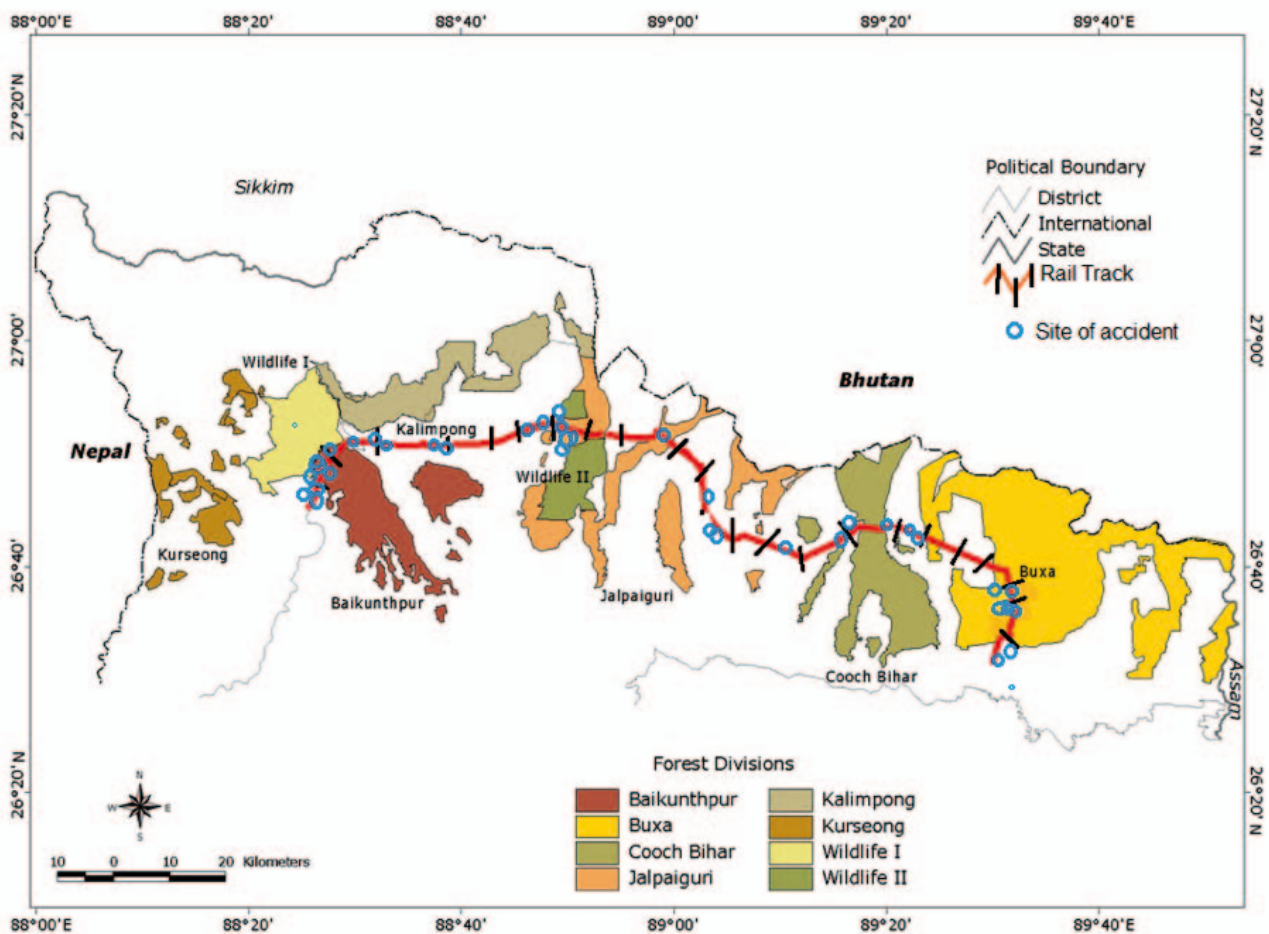
Of the 161 km of railway track between Siliguri and Alipurduar, 78 km run through protected areas (Fig. 2). This track was laid by the British rulers in early 20<sup>th</sup> century to transport timber from Himalayan foothill forests. Originally this was a meter-gauge track used by a limited number of smaller trains running at speeds of around 50–60 km/h. In 2003, the track was converted to broad-gauge with trains running at 110–130 km/h. There was a daily movement of 4–5 trains on the previous meter-gauge track, whereas 14–18 trains ply between Siliguri and Alipurduar on the present day broad-gauge track. Between 1974 and 2015, 82 elephants were killed in 56 incidents along this track (Fig. 3).



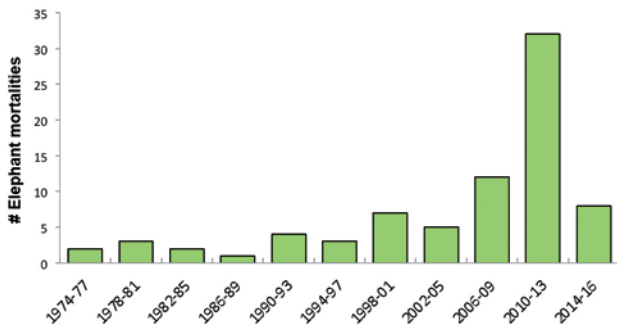
**Figure 3.** Mangled body of an adult female on Jaldhaka Rail Bridge.

### *Spatio-temporal distribution of ETC*

The locations of ETCs recorded over the last four decades on the Siliguri-Alipurduar track are given in Figure 4. In 4 accidents 22 elephants died during 2010–2013, where each ETC resulted in the death of 4–7 elephants. Frequency of ETC incidents was one or less than one per year before



**Figure 2.** Accident sites along the railway track.



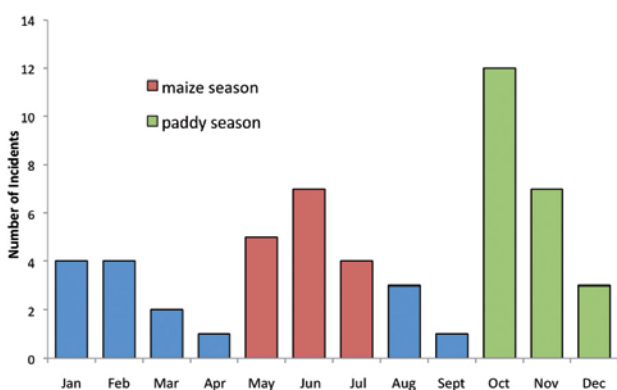
**Figure 4.** Frequency distribution of elephant mortalities in 4-year intervals from 1974–2016.

2004, which became 2.9–3 per year after 2004. There were 5 accidents at different places during 2013 and another 4 during 2015.

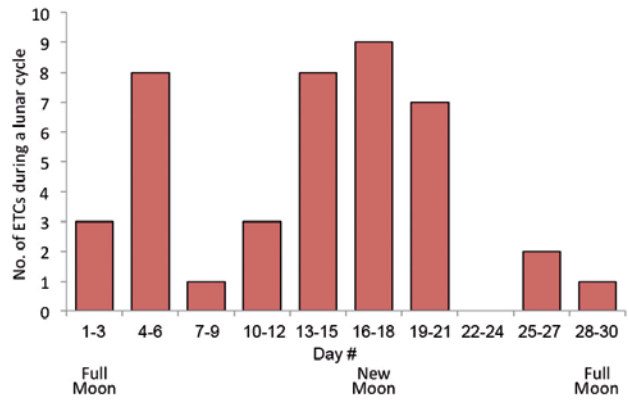
Intensity of ETC was highest with a frequency of 1 incident/km in the Gulma-Sevok stretch in Mahananda Wildlife Sanctuary. The next highest was in the Chalsa-Nagrakata stretch with a frequency of 0.84 incidents/km, which is within 2–10 km from the protected areas of Gorumara and Chapramari (Fig. 1). The majority (79%) of ETC incidents occurred either inside or within 2–10 km from the protected areas.

The temporal distribution of the ETC incidents showed a distinct pattern. The highest number of ETCs (72%) happened between 7:00 pm and 3:00 am, 20% in early morning (3:00 am to 6:00 am) and the remaining 8% during late morning hours (6:00 am to 8:00 am).

The majority of ETCs (69.8%) occurred during paddy and maize seasons. ETCs were higher during the paddy harvesting season from October to December than in the maize season from May



**Figure 5.** Seasonal pattern of ETCs.



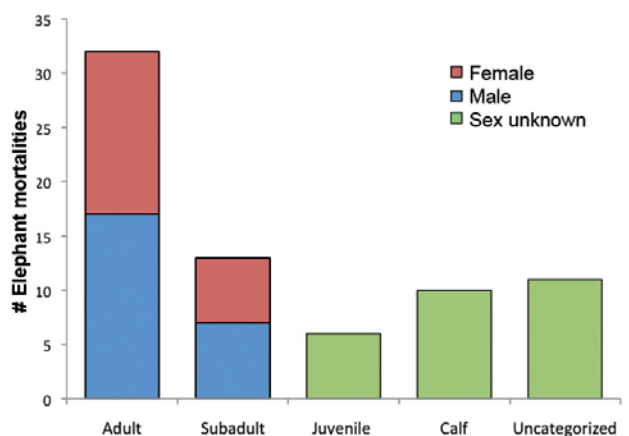
**Figure 6.** Pattern of ETC in lunar cycle.

to July (Fig. 5). The daily and seasonal differences in ETCs were probably due to differences in elephant movements related to time of day and seasonal agricultural practices.

Relationship of ETC to lunar cycles was not conclusive with a high proportion of incidents occurring from a few days before to a few days after the day of the new moon, but also with a peak about 4–6 days after a full moon (Fig. 6).

Among the total recorded mortalities in ETC, adult males and females constituted the highest number (Fig. 7).

The increase in ETCs in recent times appears to be related to the change from a meter-gauge track to a broad-gauge track, with the associated increase in the speeds and number of trains. Given that the current Siliguri-Alipurduar track runs across a significant extent of elephant range, it is likely that ETCs will continue to occur at a high level.



**Figure 7.** Pattern of elephant mortality with respect to age-sex class.

Given that most ETCs occurred during 7:00 pm to 6:00 am, revision of train schedules to decrease travel at this time and or using slower speeds, especially through vulnerable areas could be a short-term measure to reduce ETCs. The ongoing measures for reducing ETC incidents such as patrolling on the tracks, coordination between line departments, sensitization of the train drivers etc. should be continued to minimize ETCs in the short term. However, they are not a long-term solution.

Construction of over- and under-passes for elephants to cross the tracks safely may be a long-term solution. However, given the high financial outlay and the length of track where incidents occur, such an intervention is not practical.

Another broad-gauge line of 183 km between New Jalpaiguri and Alipurduar, is located to the south of the Siliguri-Alipurduar track (Fig. 1). There has been no record of elephant deaths due to train accidents on this track, as it does not cross any elephant range. The distance between the former and latter tracks varies from 5–30 km at different points. The station of New Jalpaiguri is only 7 km away from the Siliguri station. Therefore, use of the second track instead of the first is practical and would avoid elephant fatalities. A long-term solution to ETCs would be to use the New Jalpaiguri-Alipurduar track as an alternative to the Siliguri-Alipurduar track and to expand the Jalpaiguri-Alipurduar track to a double line to accommodate the increased traffic.

The Siliguri-Alipurduar track could be utilized for ecotourism or as a heritage ride as it passes through pristine forests and would provide a great opportunity to view the scenic landscapes and wildlife. Such use would carry a much smaller number of trains running during day time, that could traverse the problem areas at low speeds, hence prevent ETCs.

### Acknowledgements

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**Figure 8.** Elephants in northern West Bengal (photo by Mr. Koushik).