The villages of Weheragala and Himbiliyakada border the Wasgamuwa National Park in Sri Lanka. The inhabitants of these two villages have been living with elephants for generations. The area’s diverse habitats include secondary forests, open scrub, grasslands, manmade lakes, and agricultural fields, making it a favourite feeding ground for elephants in the region. In the past, the elephants’ frequent intrusion into the area resulted in intense human–elephant conflict. To understand the importance of mitigating this conflict in the region, in 2002 the Sri Lanka Wildlife Conservation Society established the second-ever village community electric fence, encircling the home gardens and agricultural fields of Weheragala. This pioneering work drastically reduced human–elephant conflict, as the solar-powered electric fence effectively stopped crop-raiding elephants. As a result, people began to tolerate elephants and understand their need to use habitats in their neighbourhoods. This lead to a more peaceful coexistence, as villagers adjusted their lifestyle accordingly.

However, as the need for agricultural land peaceful coexistence has reverted to conflict, with habitats outside the village fences being cleared. Although these areas provide new sources of food for elephants, venturing into them has become even riskier for these animals. This means
elephants are having to adapt by changing their behaviour and movement patterns. In an effort to help reduce human-elephant conflict in the area, we sought to understand these movement patterns by monitoring elephants between the National Park and villages. We set up remote camera traps, continuously operated from July 2016 to November 2018, on well-established elephant pathways. We quantified movement patterns in relation to time of the day, moon phases, cropping seasons, and type of elephants (male vs family groups). To treat images of the same individual or family groups as independent captures, we prepared elephant ID cards using individually unique morphological features (e.g. differences in ear folds, nicks, ear holes, tail characteristics, scars, warts and pigmentation patterns).

Left: Elephants were sharing space with people in human-dominated landscapes in Weheragala village in Sri Lanka. Photo: Chandima Fernando. Right: The frequency of elephant movements between natural and human-dominated landscapes, for males (circles, blue) and females (triangles, red) in Wasgamuwa, Central Province, Sri Lanka.

Our cameras recorded a total of 993 independent elephant detections during the study period. Males were detected more frequently than family groups. The elephants minimize the risk of encountering villagers by using the human-dominated landscapes at night. Both family groups and males moved into the villages most frequently between dusk and midnight, with a peak around 18.00, and retreated to the National Park before or around dawn. The annual movement pattern of males and family groups differed. Males had two distinct movement peaks, corresponding to the harvesting seasons for rice, watermelon and corn. The availability of crop varieties in the human-dominated landscapes attracted male elephants frequently to the villages and was not because of the lack of natural food in the protected areas. However, the movement of family groups varied only modestly by season. The differences in movement patterns between males and family groups suggest that family groups are more risk-averse compared to male elephants. The main anthropogenic risks to elephants are being injury or death from gun shots, gun traps and snares.
Designing and implementing effective crop-guarding measures is very important. Encouraging farmers to cultivate crops that both generate a high income and are disliked by elephants is a sustainable mitigation measure. In doing so, we can help farmers reduce negative attitude towards elephants. An initiative called Project Orange Elephant has already been established by the Sri Lanka Wildlife Conservation Society. The Project Orange Elephant farmers cultivate orange trees in their fields and have experienced high profit and less crop-raiding by elephants.

We hope that our findings, and information on movement patterns of elephants, can aid the development of effective community-engaged early warning systems to alert when elephants are nearby, so people can take non-lethal actions before elephants enter their crops.
The article *Asian elephant movements from natural to human-dominated landscapes mirror patterns in agricultural damage* is available in *Oryx—The International Journal of Conservation.*

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Chandima is the Ecologist and GIS specialist of the Sri Lanka Wildlife Conservation Society and leads their community integrated elephant conservation projects. Chandima is currently a PhD student at University of Colombo in Sri Lanka, studying the crop-raiding behaviour of elephants. His other research includes studies on carnivores and agricultural ornithology.