

**TEMPORAL CHANGES OF
HABITAT UTILIZATION OF
ELEPHANT HERDS IN
HUMAN MODIFIED LANDSCAPE
- A CASE STUDY**

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LANDSCAPE – A CASE STUDY**

By

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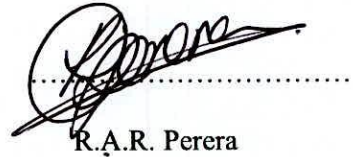
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DECLARATION

I do hereby declare that the work reported in this project report was exclusively carried out by me under the supervision of Dr. Ranjith Premasiri and a report on this has not been submitted in whole or in part to any University or any other institution for another degree.

Date: 15/06/2014



R.A.R. Perera

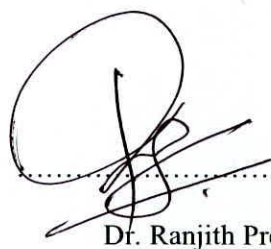
DECLARATION

We certify that the above statement made by the candidate is true and that this thesis is suitable for submission to the University for the purpose of evaluation.

Certified by:

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Date: 15/06/2014



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Dr. Ranjith Premasiri

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LIST OF ABBREVIATIONS

Abbreviation

AD	- Anno Domini
BC	- Before Christ
CITES	- Convention on International Trade in Endangered Species
DWLC	- Department of Wildlife Conservation
FD	- Forest Department
GIS	- Geographic Information Systems
GPS	- Global Positioning System
GSM	- Global System for Mobile Communications
HEC	- Human Elephant Conflict
IUCN	- International Union for Conservation of Nature
NP	- National Park
REDD++	- Reducing Emissions from Deforestation and Forest Degradation
RS	- Remote Sensing
SNWC	- Selous-Niassa Wildlife Corridor
VHF	- Very High Frequency

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ABSTRACT

Human Elephant Conflict (HEC) is a prominent social, economic and political problem in Sri Lanka. With agricultural lands getting expanded with new irrigation schemes, and land being allocated to many other mega projects, the forest area has been reduced and fragmented. The results of this study shows that these development have direct consequences on elephant habitats and therefore their survival. From this study, it is noted that RS and GIS techniques could play a vital role in understanding this complex situation, but long-term data is required to arrive at accurate conclusions. Though the data for this study collected with radio telemetry, there are new developments in the field and with satellite telemetry, more frequent data could be accumulated remotely. In order to avoid costly human elephant conflicts, in both social and economic terms and to preserve the place of pride of elephants as a natural asset of the country, it is a must to incorporate knowledge gained though these techniques into the overall national planning.

Key Words: Elephants, Human elephant conflict, HEC, Home range

Introduction

1.1 Elephants in Sri Lanka

In Sri Lanka, elephants enjoy, social, cultural and environmental bond with humans since ancient times. Elephants play important roles in ceremonial occasions, pageants, and also as work animals, now being replaced by the heavy machinery. The Kandy Perahera, one of the most prominent cultural festivals in Sri Lanka and dates back over 220 years, is adorned by parading of more than 100 elephants every year. New year festivals feature elephants in various sports. Until the European influence changed the strategies and equipment of war, elephants were a significant part of the army. They were used for transport goods as well as used as an instrument of offence and defense, and had played important parts of many battles as recorded in the history. A good example is, the Kandula, the royal elephant of King Dutu Gemunu. Many Sri Lankan folklore, songs, lullaby have elephants as its characters.

The Sri Lankan elephant (*elephas maximus maximus*), a one of three subspecies of the Asian Elephant is native to Sri Lanka. It has been listed as an endangered animal by the IUCN since 1986 (Weerakoon & Gunathilaka 2006). The elephants usually live up to seventy years (less in the wild as recorded, due to both natural and anthropogenic reasons), come to sexual maturity around thirteen years and have offspring until they reach around fifty years of age. Usually they produce a single calf and interval between births is three to four years. Elephants are intelligent animals having a good memory and hearing but poor eyesight. It is estimated that Sri Lanka has the highest density of elephants in Asia (de Silva *et al* 2011)

Elephants usually consume up to 150 kg of plant matter per day. A recent study in North Western Sri Lanka has recorded that the elephants fed on a total of 116 plant species belonging to 35 families including 27 species of cultivated plants (Ekanayake *et al.* 2011; Samansiri & Weerakoon 2008). More than half of the plants were non-tree

species, i.e. shrub, herb, grass, or climbers (Samansiri & Weerakoon 2008). It is also noted that the food resources favoured by elephants are abundant in regenerating forests, but at low density in mature forests. Traditional slash-and-burn agriculture creates optimum habitat for elephants through promoting successional vegetation (Perera & Weerakoon 2000).

With the development work and human settlements spreading out, the elephant habitats have got broken up and some herds have been restricted in small pockets of jungle. When the food and water resources getting depleted in these pockets, elephants wander into the adjoining areas, which most of the time are agricultural lands (Perera & Weerakoon 2000). Due to their large size and appetite, within one night of intrusion, a whole cultivation of a poor farmer could get destroyed. Also the presence of animals within and around the human settlements greatly affect the villagers' day-to-day affairs such as their overall mobility, fetching water and firewood, children's attendance in school etc.. Most of these farmers grow paddy and even after harvesting, sometimes elephants resort to look for paddy storage at households in nights, which most often results in braking down the walls if not the whole house, making people unsafe sleeping in their own houses. All these incidents create anger and frustration within the affected people and they resort to various ways of driving elephants away (Haturusinghe & Weerakoon 2000).

The human elephant conflict (HEC) has been recorded from many parts of the country and increasing, resulting in many elephant and human deaths and loss of property and crop. The main cause of HEC is identified as crop raiding by elephants. While the African elephant's misfortune is its tusks, the elephants in Sri Lanka is being threatened more by habitat loss and fragmentation as a result of escalating human population than by poaching for ivory; given that today only 7.3 % of the bulls have tusks (Hendavitharana *et al.* 1994). Now the whole burden of solving the HEC has become the responsibility of the Department of Wild life Conservation and now they are in the receiving end of the wrath of villagers for not being able to find a lasting solution (Fernando *et al.* 2005).

1.2 Elephant Population and Management Issues

Apart from managing declared Protected Areas, the Department of Wildlife Conservation uses several methods to manage human elephant conflict, i.e. elephant drives, translocation of problem animals and erecting of electric fences. Also, it is noted that most of these measures have been implemented as responses to some critical situations arises in the field, not as components of an overall integrated plan. However, the efficacy of these measures in attaining desired results are debatable.

The elephant drives are conducted with large number of people, making a lot of noise to drive herds from one location to another. Since the male elephants are generally lone roamers and herds are mainly consist of females and their off-springs, usually the elephants that are chased away in a drive are of the second category. So drives leave majority of the male elephants behind making them deprived of the company of females when required (Gunawardene *et al.* 2004). Some of the problems that associate with elephants drives are;

- Elephants become unresponsive to things like firecrackers and firing in the air, ultimately leading to the drive either becoming ineffective or having to resort to more lethal deterrents such as shooting.
- Government agency organized elephant drives reinforce the idea that the state is responsible for protecting people from raiding elephants, leading to worsening of relationships when the elephants become unresponsive to chasing and/or the authorities cannot respond quickly.
- When elephants are 'chased' from one locality, they probably just move to another locality, which is not so protected. Because elephants have large ranges, the area of HEC is vast, and it is not logistically possible to undertake such activities across the entire area. So the exercise ends up with chasing elephants from one crop area to another, and back again. (Fernando *et al.* 2004)

The records show, in the many instances of translocations of problem elephants, almost all have gone out of the protected area they have been released into. Some of them have returned to the original place they had been captured, and others had roamed into other

cultivated and developed areas and had done devastation there. A quite number of such translocated elephants have died within months of translocation due to human elephant conflict in the new area they are forced to live in (Fernando *et al.* 2008).

The electric fences have proven somewhat effective, but only when paths of those are decided on ecological boundaries rather than common practice of erecting fences along the Department of Wildlife Conservation managed areas or other administration boundaries (Fernando *et al.* 2008). Though there is no rationale in erecting a fence while having elephants both sides of the fence, that is what exactly happening in the field presently, where only the already established boundaries (for management purposes) are taken into account. Commitment of villagers are required to maintain the fence once erected, as it is impractical for authorities to oversee every meter of the fences erected. When neglected and overgrown with vegetation, the fences become dysfunctional. Therefore, proper prior understanding of elephant's habitats, their home ranges and the commitment of the affected people to maintain the fence are very important factors in designing solutions of this nature (Fernando 2010).

1.3 Use of GIS and Remote Sensing as a Tool of Wildlife Management

There are number of ground survey methods used by wildlife conservation practitioners to assess animal populations and their habitats; counting animals, trapping, collection of droppings, investigations of feeding sites as well as ground mapping of habitats (Giles 1978; Kotwal & Parihar, 1988; Lamprey, 1963). Wildlife habitat mapping is similar to any type of land cover mapping (Lindgren 1985). Both biotic and abiotic surface features including vegetation composition and / or density and landforms can be mapped and interspersions of habitat components, the extent of habitat types and the distance to other critical habitat components can be measured (Best, 1984).

In most instances, remote sensing can supplement or partially replace tedious ground survey methods. Moreover, ground methods have limitations as whole area cannot be accessed in one go and therefore, in many cases the information collected may not