

The Last Trumpet from *Sinhajara*: A Status Study of Elephant Population in Sinharaja World Heritage Site

Manjula Karunaratne

Department of Geography
University of Ruhuna
mlankanath@gmail.com

Abstract

Interaction with elephants is reflected everywhere across the socio-cultural, political and ecological canvas of Sri Lankans. Prior to the British colonization of Sri Lanka, the elephant population was higher and its distribution across the island was wider. The elephant population was greatly reduced and its habitats were limited to the dry zone ecosystems as a result of colonial plantation and industrial activities. However, even today there remain a few elephant herds in the rain forests despite the fact that they are faced with a number of survival challenges. Sinharaja is one such rain forest that remains as a biodiversity rich and culturally unique world heritage site in Sri Lanka. There are more than 24 villages in the periphery and the villagers have been keeping their traditional folk life for thousands of years. Against this background, this paper focuses on the last few elephants of Sinharaja rain forest, with attention to their role in the ecosystem and their impact on the socio-cultural environment. Further, the paper discusses how environmental conservation needs clash with cultural, socio-economic and political values, regarding the welfare of the elephant population. As the research employed a qualitative methodology, the primary and secondary data were gathered from focused group interviews, semi-structured interviews, direct observations, and published secondary sources, and the data analysis was carried out by means of a thematic analysis. On the whole, the study reveals the importance of elephants as an integral component of the ecosystem and proposes application of in-situ conservation methods to ensure their existence in Sinharaja. Finally, it recommends introducing new herds of female elephants to increase the elephant population of Sinharaja.

Keywords: Conservation, Elephants, Sinharaja, Socio- Cultural, Reintroduce

1. Introduction

Sinharāja rain forest of Sri Lanka is well recognized all over the world as a tropical rain forest with a rich biodiversity (Gunatilleke and Gunatilleke, 1985; Bambaradeniya *et al.*, 2003; Gunatilleke *et al.*, 2008). As a result, the UNESCO declared it as a natural world heritage site in 1988. According to the recognition of the community both at local and national level, this is a prototype of a Tropical

Lowland Rain Forest. They opine that to call a forest a forest it must be one like Sinharāja. Various factors have had an influence on the origin and growth of that view. The factor on which the present study concentrates is the meagre presence of elephants in this forest. Over 10% of the global Asian elephant population in less than 2% of elephant range (Leimgruber et al., 2003), makes Sri Lanka the range country with the highest density of elephants (Fernando et al., 2011). Their presence in a forest is recognized as a characteristic indicative of profoundness and as a sign of its ecological prosperity. Therefore, it is necessary to consider the topic “a Sinharāja devoid of elephants” not only through the point of view of ecology but also of social circumstances, because the prototype Sinharāja makes in the mind of the community is strong. By now, there are only two elephants in Sinharāja (Ranwella, 2018; Ranukkanda, 2018) and they may probably represent the last generation of this largest living land animal in Sinharaja. So, once these two “land giants” disappear, the elephants of Sinharāja will certainly be just a reminiscence that belongs to history. The object of this paper is to examine the role of the elephants in Sinharāja through the point of view of conservation biogeography. The paper will also be a prophecy of the future existence of Sinharāja.

2. Elephants of Sri Lanka

The elephant, the largest living land animal on earth can live in different geographical ranges. However, elephants are absent from American continents as well as from the continent of Australia. In every other geographical region or land, man and the elephant had lived in its various evolutionary processes as indicated by the evidence (Parakrama, 2006). But by now only two species remain; African Elephants (*Loxodonta africana*), and Asian elephants (*Elephas maximus*). There are two sub species of African elephants namely *L. a. africana* and *L. a. cyclotis*. Three sub species exist within the Asian elephant, namely *E. m. maximus*, *E. m. indicus* and *Elephas m. samantranus* and some studies classify the Bornean elephant too as a distinct sub-species (WWF, 2019). Asian elephants have been listed as ‘Endangered’ under IUCN red listing criteria (Choudhury et al., 2008). Out of these three sub species, the one found in Sri Lanka is native to the island (Ranjeewa et al., 2018; Fernando, 2015).

Elephants are held in esteem not only in the sphere of forest systems but also in the socio-cultural environment. Therefore, it is impossible to discuss elephants by ignoring the aspect of their social relations. However, what we focus on here is to gain a fundamental knowledge of the Sinharaja elephant population in Sri Lanka. A

good number of estimations and surveys have already been made by various individuals and numerous institutions with multifarious objectives (Hendawitharana et al., 1994; Dissanayaka et al., 2012; Morgan-Davies, 2013; Fernando et al., 2011).

Nonetheless, it was in August 2011 that an all island survey was conducted for the first time. The summary of this survey is given in tables one and two. According to these data, over 90% wild elephants live in dry zone eco systems. Elephants are also not limited to protected areas and higher densities are found outside where food and water is more plentiful (Fernando et al., 2011).

Table No.01: Estimated Population of Elephants in Different Wildlife Management Zones of Sri Lanka

Distribution of Elephants as Per Wild Life Zone	Number
<i>Mahaweli zone</i>	1751
Central zone	47
Eastern zone	1573
North-western zone	1189
Southern zone	1086
Northern zone	233
Total	5879

Source: Dissanayake, et al., 2012

In addition, there are about 150 domesticated elephants according to available reports (Dissanayake et al., 2012) Concurrent with this, the human elephant conflict has developed as one of the main environmental issues. Owing to the human elephant conflict, deaths of 87 men and 256 elephants had been reported in 2017 (Department of Wildlife Conservation, 2018). This study is carried out with special reference to the elephants confined to the forests of the Adam’s Peak and Sinharaja forest, both situated within the Wet Zone of Sri Lanka. According to reports, about 19 elephants are found in Adam’s Peak range (Dissanayake et al., 2012).

By 2012, only two elephants are found in Sinharaja (Kumara and Ali, 2013). Even in 1994, two elephants have been reported from Sinharaja and one of them has been identified as an adult male (Hendawitharana et al., 1994). In this context, elephants living in the wet zone are in danger of extirpation.

3. Study objective

Main objective

- To identify ecosystem, socio-cultural, political and conservation importance of the last few elephants of Sinharaja rain forest.

Specific objectives

- To find a suitable conservation approach to ensure the existence of Sinharaja elephants.
- To analyze the discourse of Sinharaja elephants toward mitigating human-elephant conflict.

4. Framework of concept

The conceptual framework of this study focuses on achieving study objectives. It consists of three fundamental attributes. i.e.

1. Role (Importance) of the *Sinharaja* elephants
2. Threats (Challenges) for their existence
3. Ensure (Opportunities) their existence in *Sinharaja*

To fulfill the objective of the study, the structure is arranged under the following aspects; ecological value, conservational and management value, cultural and spiritual value, socio-economic value, political and administrative value.

5. Methodology

The qualitative research methodology has been used as a methodology of this study. It is more useful in understanding socio-cultural, economic, political as well as environmental phenomena. The comprehension of social experiences, attitudes, practices, norms and beliefs is focused on by this methodology, rather than collecting numeric data (Bricki & Green, 2002; Bryman, 2012). The qualitative research methodology was gradually developed as a systematic research approach practically helping to understand many complex social issues (Denzin & Lincoln, 2000; Tetnowski & Damico, 2001; Bryman, 2012). In the field of conservation and community conservation, this methodology is more applicable than before (Newing, 2011).

5.1 Data collection

This study is mainly based on secondary data. Secondary data in the study are extracted from a number of publications by local and international authors, especially those that include information about conservation and community conservation, biodiversity in Sri Lanka, human – elephant conflict in Sri Lanka, elephants of Sri Lanka, conservation biology, Sinharaja rain forest, tropical forest management, etc.

The focus group interviews, semi-structured interviews, telephone interviews and direct observations have been employed as methods of collecting primary data. 15 semi structured interviews were conducted in this research. The semi-structured interviews are presented by their categorical code. For instance, in ‘SSI05 Wildlife Officer’, ‘SSI05’ stands for ‘semi structured interview number 05. Four focused group interviews have also been conducted for the primary data collection process. They are also presented by categorical codes as ‘FGI02 Officer at Forest Department’: ‘FGI02’ indicates ‘focus group interview number 02’. Three telephone interviews also have been conducted to collect primary data. They too are presented in categorical code as ‘TPI01 Environmental activists’: ‘TPI02’ implies ‘telephone interview number 02’. In order to protect the respondents’ identity the above coding method has been used to illustrate their case studies in the text (Israel and Hay, 2006).

5.2 Sampling method

‘Snow-balling’ sampling method has been used for the semi-structured interviews, focus group interviews and telephone interviews. ‘Snow-balling’ is based on the metaphor that when a real snowball is rolling down the hill, its size gradually increases until it approaches saturation (Hibberts et al., 2012). Thus, the researcher must gather enough data using a chain referral process until it approaches saturation. This method was useful in this study, since it helped to gather information from diverse respondents to achieve study objectives.

5.3 Data Analysis

The thematic analysis method has been used to analyze qualitative data towards achieving the objective of the study. This is one of the common methods to analyze, present qualitative data and essentially a method for identifying and analyzing patterns in qualitative data (Clarke & Braun, 2013). Conceptual framework of the study is illustrated by the following diagram which has been developed based on themes which are found from analysis of the study. The copyrights have been acknowledged for photographs downloaded from the internet and the scholars.

5.4 Study area

Sinharāja, which is bounded by districts of *Ratnapura*, *Galle*, *Matara* and *Kalutara* belongs to the group of lowland rain forests. Solely due to the value of biodiversity attached to it, Sinharāja was declared as a world Heritage forest reserve by UNESCO in 1978. (See Figure 2) Its total spread is 11187 ha and the distribution through ranges of mountains exhibits somewhat strip-like appearance (Forest Department, 2003).

About 25 old villages lie around the forest. Their lives and activities are directly and indirectly associated quite closely with Sinharāja forest. (De Zoysa and Raheem, 1993) By now Sinharāja is famous as one of the main tourist destinations among both local and foreign visitors who enter the place through three entrances, namely *Kudawa*, *Pitadeniya* and *Morning* side (Forest Department, 2003).

However, illegal clearing and encroachment, hunting and removal of selected trees and herbs, illegal constructions, and other human interference are still being reported as a threat to the biodiversity in Sinharāja (IUCN, 2014; Karunarathne, 2012).

6st Phase - Values

6.1 Ecological Value

The taxon of elephants found in Sri Lanka is a sub-species of Asian elephants, which is scientifically known as *E. m. maximus*. These elephants are commonly found in large populations within the dry zone forests of the island. Nevertheless, by now they occur only in the Adam's Peak Forest Area (*Samanala* Nature Reserve and the Peak Wilderness Sanctuary) and the Sinharāja World Heritage Site within the wet zone of Sri Lanka.

“Though they say there are three elephants since recent past it has been reported that there are only two. Both of them are males. These are the last two elephants in Sinharāja” (TPI01. Wildlife researcher, Colombo – 2016.07.20).

Because of the realization of this ecological value, the elephant is ecologically designated as an “Umbrella species” and “Keystone species.” A particular species living in a particular eco-system is known as an umbrella species or keystone species if it performs an extremely important role for the existence of that ecosystem and its functions. In other words, so many other lives depend on the activities of that particular species. In conservation perspective, umbrella species' home range is

rather wider than other species. Therefore, if the target species can be protected, many other species will automatically be protected under that umbrella species (Simberloff, 1998). Elephants are mega-herbivores, with a daily food requirement of about 10% of their body weight (Sukumar, 1989). Thus, they have to find a large quantity of food, which means they cannot be specialized feeders selecting a narrow range of plants or the choicest plant parts (Fernando, 2015). So elephants can be identified as both umbrella and keystone species. “If such an eco-system is deprived of the particular species either due to its removal from it or its extinction the latter would collapse the former” (Parākrama, 2006, p.21). Namely, in maintaining the said eco-system balance the existence of those species perform a decisive role. On the other hand, The Asian elephants are an ‘edge species’ dependent on forest-edges or eco-tones (Fernando 2006; Fernando & Leimgruber, 2011). In the case of elephants, their existence is important to an eco-system as it determines the maintenance of a definite genera of plants and direct and indirect ecological activities such as food patterns of other herbivorous animals, determination of migration routes, search of water sources during the drought, providing habitats for micro-organisms, seeds dispersal, enrichment of soil nutrient (Fullman and Bunting, 2014; Parker, 2008; Kerley et al., 2008). Those functions can decisively influence on a particular flora or fauna species or the whole eco-system. As it is these two elephants who play the above ecological role in Sinharāja and other adjoining forests their extinction may exert both direct and indirect influence on its eco-system and existence of its fauna and flora.

6.2 Forest Conservation and Management Value

Elephants have a strong attachment to their home ranges as it is related to their fitness (Fernando et al., 2008). The assistance given by these elephants to Sinharāja forest and its accompanying other forests such as *Hadapan Ella*, *Beragala* and *Walanakanda* for their protection is indeed immense. Using the present data, the fundamental niche or the extent of occupancy of the elephants was estimated to be 22,853.9 ha (Ranukkanda et al., 2018). All associated forests have been included in their fundamental niche. Almost everybody fears to enter a jungle where there are elephants. This fear of elephants is instrumental in the protection of the forest and it is an opinion unanimously approved by the Forest Department, Department of Wildlife Conservation the police and the village folk.

“What remains is two male elephants. If some female elephants are introduced to Sinharāja and if this generation goes on in the future, it will be extremely good. But nobody likes to take the responsibility. Such situation is

due to politics and other narrow objects. The role these two elephants play to protect the jungle, even a hundred of our officials won't be able to perform'' (FGI01. Officer (FEO) from Forest Department, Kudawa - 2016.07.18).

“There was no trouble from them. It was people who provoked them. They hurt them by burning, throwing flam beams at them and by shooting. Now see everybody who has been assaulted had done something to provoke him. Villagers know it very well. Further, it is those racketeers who do illegal activities inside the forest who claim that the elephants are to be taken away.” (FGI02. Officer (FEO) from Forest Department, Kudawa - 2016.07.18).

As racketeers themselves acknowledge, these elephants are the major threat to illegal felling, mining gems, hunting, bootlegging, etc. At a number of occasions, these elephants have attacked such places and persons. As a result, there was an effort to capture the elephants in question in 2000 so as to domesticate them, in fact one of them (*Panu Dalaya – Bull elephant with small tusks*) was anaesthetized, but the residents of the locality rose to the occasion and made a protest against the racketeers and responsible politicians. Consequently, the racketeers and the politicians had no alternative but to release the elephant.

But Malani Premaratne, the District Secretary *Ratnapura* (2002), reported to the effect, that the said protest was made by Non-Government Organizations, but at a meeting held at *Kajugaswatta* College on 01.08.2001 the people made a strong request to the officials so as to capture the elephants and take them away. As she says the reason for this request stems from the killing of a woman by an elephant. However, this is actually a distortion of the situation that had prevailed or is still prevailing and is an attempt to force the opinion of the minority on the majority.

“95% of the villagers oppose removal of elephants. Those who say that elephants must be taken away are the very people who have come from elsewhere and engaged in illegal activities inside the forest. It is true that some of the villagers are also for the suggestion. Elephants visit the village somewhere in March, April or May. The reason is that is the time when they migrate from Sinharāja through villages to *Walankanda* forest. During this time certain incidents occur. It is due to carelessness of people and their own activities detrimental to elephants” (SSI01. The president of local environment conservation, Kalawana - 2016.07.18).

As the above incident shows, the three elephants render an incalculable service to protect Sinharāja and its accompanying forests. As such, the Sinharāja and peripheral forests devoid of elephants will be a challenged in their survival.

6.3 Socio – economic value

Some of the residents hold the view that due to these elephants, the whole lifestyle of the community has come to a standstill and they are in dire need of leaving the place (Department of Wildlife Conservation, 2002). This is really an exaggeration of the case in question. Actually, the elephants have not retarded day-to-day life of the community, but on the other hand, due to annoyance caused by some individuals, harm has been caused to people and property.

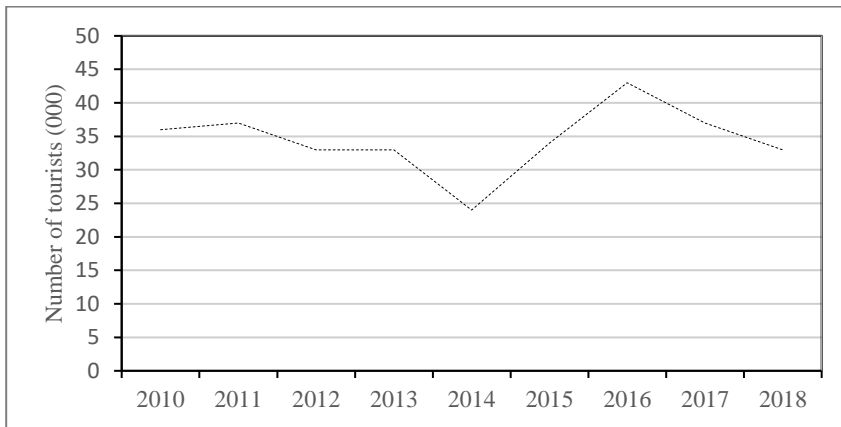
“The remaining two elephants have grown up in Sinharaja. Nobody has studied the work done in order to maintain this eco-system. What most of the people are doing is to wash one’s hands off by taking them somewhere and putting them there rather than to protect the elephants. Actually, speaking too much of these elephants is a headache. Every time the suggestion came up to take the elephants and dump them somewhere, we opposed” (SSI02. Veterinary surgeon from the Department of Wildlife Conservation, Udawalawa - 2016.08.19).

Nevertheless, this is a case which can be remedied by adopting *in-situ* conservation approaches. The removal of elephants is not the one and only remedy for this problem. Such a measure will be the beginning of numerous other difficulties. The attention of policy makers has not been paid toward the socio-economic worth of these elephants. These two elephants have contributed directly and indirectly to the tourist attraction of the place and protecting and managing the environment. When considering diversity and richness of species, these elephants are not excluded from them.

“Visitors who come to my guest house try to see Sinharaja elephants especially after media propaganda related to several incidents of the elephants. Now these elephants are very famous among visitors. Anyway, it is not easy to see them and it is dangerous. I never encourage visitors to see wild elephants in Sinharaja. However, some are eager to see them. Nowadays some people are constructing hotels in *Botiyathenna*. After that, it will be easy to see elephants.” (TPI02. Guest house owner, Hadapan Ella - 2019.01.10).

They have gained fame among the masses as the last generation of elephants residing in wet zone. Due to tourist traffic, direct and indirect means of earning have been opened to residents. The following table indicates the annual income (through sale of tickets alone) earned by the Forest Department out of tourists who visited Sinharāja Forest through *Kudawa* entrance. (See Figure 01 and 02)

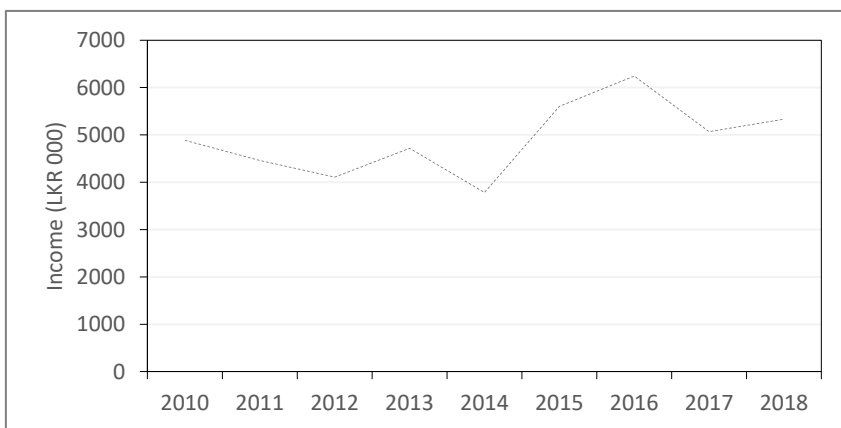
Figure 01: Tourist Attraction of Sinharāja



Source: Field Survey, 2018

Although all these tourists do not visit the forest with the sole intent of seeing the elephants the contribution of the latter as a tourist attraction cannot be underestimated on that account.

Figure 02: Tourism Income Received out of Sinharāja 2010-2018



Source: Karunaratne, 2018

The indirect contribution elephants make is obviously the protection of the forest cover and they are part of biodiversity in Sinharaja. The elephants have been identified as a Keystone and Flagship species from the view of ecology and conservation (Simberloff, 1998; Kerley et al., 2008). Therefore, effects of their behavior silently contribute to indirect social and economic development as well. There is a potential to distribute Kudawa tourist traffic along the North border of the Sinharaja, which would help community-based conservation and development approach. Some scholars have identified that the gap between responsibilities and benefits of conservation must be decentralized (Karunaratne, 2012; Sandbrook, 2012). Eco friendly, community based and small-scale tourism have good potential to grow in this field. Accordingly, the socio-economic benefit they bring in should be appraised along with the accusations of the harm caused by them. Otherwise one will fail to see the whole picture.

6.4 Cultural and spiritual value

Elephants have made a unique contribution to various religious and mundane affairs in the culture of this country enhanced by Buddhism and Hinduism. The gratitude of man toward elephant is such heartfelt that if an elephant is in distress it is not rare to find men who offer to rescue it even at the risk of their own life. However, these very people clamor and brand the elephant as a pest based on colonialism and green revolution

Among the community, there is such an awe-inspiring affection for elephants of Sinharāja too. The traditions which center round them are also numerous. As these traditions say elephants harm you only if you hurt them and even after a long time they take revenge. Even biologically speaking the elephant is an intelligent being. It is the general opinion that all those who were killed in Sinharāja by elephants had interfered with them.

Although it is a common occurrence for those who walk along the *Rakwana – Potupitiya* Road to come across elephants, they generally do not waylay or drive away the victims and assault them. As reports indicate elephants assault people on a number of occasions. They include brutish actions such as setting fire by men to the grass and chase and confining the animal within the forest or shooting or burning the trunk of the animal by throwing burning ash and pieces of cloth on it or flinging flambeau at it or throwing firework at the animal.

A singular attention is paid to the elephants of *Sinharāja* not only because they reside in the most reputable forest in the island but also that it is these two elephants which

represent the last generation of this *E. m. maximus* of the lowland wet zone. If these elephants cease to exist in Sinharāja forest spiritual relations that exist between the elephant and men also will die out. Then the elephants of Sinharāja will be a part of history. Therefore, this cultural and spiritual wealth must be protected.

6.5 Laws, Policies and Institutional values

Very special provisions have been made in the Fauna and Flora Protection Ordinance (FFPO) for the protection of elephants and tuskers. According to the FFPO provisions, hunting elephants and tuskers, and catching and inflicting various kinds of harm on them are serious offences (FFPO, part – II, TUSKERS, ELEPHANTS, BUFFALOES, DEER AND FOWL). The rules and regulations pertaining to elephants have a direct and indirect effect in protecting the surroundings where they live. It is equally applicable to Sinharāja. It is the Forest Department and Department of Wildlife Conservation which interfere with matters dealing with elephants. Moreover, this property is afforded the highest level of legal protection under the National Heritage and Wilderness Area Act of Sri Lanka. Thence, the elephants of Sinharaja and their physical environment is protected mainly by dual legal prudent conducts and dual organizations. In addition, even though organizations such as “*Gaja Mituro*” an informal protection is extended. So, for the implementation of legal procedure and establishments and their attraction referred to the above, it is essential for the elephants to live in these forests. It will be a decisive factor not only at national level but also at international level. There are ten criteria to select a world heritage site by UNESCO. Out of them, the ninth and tenth criteria directly support to ensure the existence of elephants within Sinharaja.

“To be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals” (UNESCO, 2019).

“To contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation” (UNESCO, 2019).

According to the above criteria, the government of Sri Lanka and the other responsible authorities cannot violate those conditions and if they violate those conditions, the UNESCO can take an action against such activities.

7. 2nd Phase - Influences

7.1 Extinction

As Darwin disclosed a number of factors contribute to the extinction of a species of fauna or flora (Kolbert, 2014; Quammen, 1997). In his description of the struggle for existence among species of plants and animals, he pays especial attention to elephants (Kolbert, 2014; Quammen, 1997). Given below is a description of the last population of elephants lived in Sinharaja by Dr. Nandana Atapattu.

“Even the herd of elephants isolated in Sinharāja is the same. According to unconfirmed reports that reached, in the latter part of 1950 decade 14 elephants were frequenting there. After 1985, seven deaths of elephants occurred there, and it was officially reported that 5 deaths out of it occurred in area associated with settlements on the eastern boarder of Sinharāja and two deaths somewhere close to Deniyaya. Except one case, all other cases happened by shooting

However, by 1990 there were only three elephants left. All the three animals were well-built males. Accordingly, if the 14 elephants reported in the decade 1950s is correct, in addition to two dead and three living elephants, the issue arises as to four others treated as missing ones (Atapattu, 2012, pp.225-226).

However, some researchers disclose (Sirisena, 2013) that during the period 1920-1960, some 15-20 elephants lived in Sinharāja and one elephant was reported as far back as 1930. Further, as traditions assert elephants migrated from *Sinharāja* through *Panāmura* to *Udawalawa* zone and through *Atwaltota* to Adam’s Peak range (Sirisena, 2013).

The factors such as deforestation and allotment, construction of roads, settlements and plantations, hunting, and auctioning (as oral evidence asserts at *Delwala* in 1970, an elephant was sold by auction) must have had an adverse influence on the migration of elephants and thus it came to an end.

The three elephants residing in Sinharāja today are males (Perera, 2010:454). Many a villager is of the opinion that one of them is a female and the other two are males. However, after 2010, that female elephant has not been recorded (Ranukkanda *et al.*, 2018).

“There are three elephants. Two males and one female. They are about 30-40 years old. To protect this generation if two more she elephants are introduced it will be successful. It is the two male elephants that always come to the

village. There will be a decrease in this pattern if the females are introduced” (FGI03. Officer (FEO) from Forest Department, Kudawa - 2016.07.18).

For the process of reproduction of a species, there must be a minimum viable density of population. Although it is necessary to carry out a long and a deep study in order to ascertain this value for reasons such as in Sinharāja only two elephants live and as they age, behavior pattern and biological traits show that it is very likely that they will not give birth to a new generation. In other words, elephants of Sinharāja are at the risk of extinction. This is a type of human induced extinction (Kolbert, 2014; Quammen, 1997) not only the elephant but also the extinction of a number of processes connected with this animal. (See Figure 6)

7.2 Deforestation and Forest Degradation

The forest cover in Sri Lanka is about 19% (Baldwin, 1991), even out of that the wet zone forests which are rich in biodiversity is very few. “Of the total land area of the island, the lowland rain forest covers less than 2%, sub-montane and montane rain forest contribute only a further 1% and 0.05% respectively, to Sri Lanka’s natural forest cover” (De Silva, 2014: p.16). Sinharāja contributes only to the first two forest types mentioned above. Sinharāja, which is a UNESCO world heritage forest reserve is 11187 ha in extent. Like other forests in the Wet zone, here too the forest is found only as a narrow strip along the hill ranges. Moreover, settlements lie both on the peripheral valleys of these forested hills and even inside the forest. In Sinharāja, there are 24 peripheral villages and 2 villages inside the jungle (De Zoysa and Raheem, 1999). Being a narrow strip-like forest range, even Sinharāja is not free from the influence of deforestation and forest degradation while the forest is not independent of both direct and indirect effects of the human population explosion (De Zoysa and Raheem, 1999). Among the factors affecting the elephant’s habitat illegal activities performed inside the forest such as gem mining, timber felling, illegal distillation of local liquors and bio – piracy carried out jointly with foreign investors and dealers are still increasing. Setting the elephants’ feeding lands on fire and the construction of roads and the buildings further cater to this problem. As forest officials and villagers opine, frequentation of elephants in Sinharāja would minimize such incidents.

“But what I feel is the day they go extinct, worth of Sinharāja will decline by about 50%. It is not only based on ecology or biodiversity alone. It also has something to do with loss of the entire socio-cultural reception. In the process of conservation of Sinharāja, no attention has been paid to elephants and the

service they have rendered. Once the elephants go extinct and Sinharāja loses them, the protection of the forest will not be an easy task. The reason is the destruction of the jungle which goes on in its inside. The reasons are putting up of huts inside, hunting, digging mines, and illicit distilling. It is nothing but these elephants are the most leading obstacle to those illegal activities” (SSI04. Freelance environmental journalist, Udawalawa - 2016.08.20).

It is nothing but the fear of the elephants on the part of those who enter the forest acts as an obstructive factor. That is the reason why those who are up to illicit practices in Sinharāja put forward the organized opinion that the elephants should be removed from the forest. On the outside of the Sinharāja World Heritage Forest Reserve, there stand many forests either of the same or more importance than the former. They come under the authority of the Land Reform Commission (LRC). The peripheral forests of Sinharaja have not gained the attention of the responsible authorities. However, these forest areas are protected by the migratory patterns of elephants. The frequentation of elephants directly helps to minimize the destruction of forests and human activities in these forest zones which are neglected by authorities. The residents of villages *Potupitiya, Ilubakanda, Denavakkanda* etc. call the elephant that frequent the area as “*Ali Ranger (Elephant Ranger)*”, implying its similarity to a Forest Range officer, honoring the silent service rendered by elephants in protecting these forests. The day elephants in Sinharāja gets extirpated the protection afforded to it also will vanish.

“There is a lot of illegal gem mining, illegal alcoholic doing, illicit felling of trees and illegal plantation specialty. Therefore, the claims of the people are here to be weighed against the reasons why they had ventured into the forest. If they had walked into a dangerous situation, then that is the problem. The removal of these elephants may help the illegal activities in view of the current law levels of law enforcement in this area” (TPI02. Senior environmentalist and advocate, Colombo - 2018.06.15).

7.3 Human – Elephant Conflict

According to Malini Premaratne, the District Secretary, *Ratnapura* (2002) who presents facts before the workshop held in order to minimize the human – elephant conflict in Southern Wildlife zone in 2002, *Rambukana – Kajugaswatta* zone is the worst affected zone. One death of an individual, two cases of serious injury, two damages to houses, two damages to vehicles and other kinds of damages have been reported in this zone. The root cause of the conflict between human and elephants is the elephants that reside in Sinharāja. According to Premaratne, *Godakawela* -

Kahawatta zone is the fourth risky zone where these elephants roam (DWC, 2002). However, it also highlighted the main cause for the conflict as illegal activities of the people of the area (DWC, 2002, p.15). According to Ali and Kumara (2014) it has been reported that during the period 2009-2013 elephants had entered villages and cultivations 129 times and one female elephant had entered village 57 times. But the animal they designate as a female elephant has not been observed during the said period. In years 2010-2011, two deaths due to the attack of elephants were reported. (See Figure 7) In addition, assault on vehicles, cattle, plantations and houses have been reported (Ali and Kumara, 2014). Although this report contains shortcomings, as a whole it points out that in this zone combat between human and elephant is on the increase. According to present data, eleven human deaths have been recorded due to human-elephant conflict (Lakmali, 2019).

The principal factors behind this expansion include illegal human activities that take place in forests where elephants frequent actions of humans for no valid reason when they are present in the forest, (using thunder flash shooting, setting dangerous traps, burning the body by throwing fire from a distance, unnecessary annoyance and blaring horns of vehicles, establishment of plantations and human settlements, obstructing traditional routes of migration of elephants, and unawareness on the part of man about elephants) cause annoyance to elephants. However, owing to the combat between man and elephant, it is clear that both parties are very much hurt but ultimately it is man himself who has created this situation.

7.4 Wane of Community Perception on Elephants and the Traditional Knowledge

Elephants are not only an essential part of natural surroundings of this country but they also play a significant role in its socio-cultural environment (Manatunga et al., 2016). Elephants have become the elements such as language, folklore, and artistic creations etc. that express the consciousness of the general public. It is this transmission of these elements which compel the community to offer its service when the elephants are in danger even at the risk of their own lives and even in a locality where human-elephant conflict is intense. Friendly relations humans had with elephants ultimately led to a clash with each other due to a multitude of factors. Yet, elephants still retain in the consciousness of the people in this country as an esteemed animal. Even the pattern of thought of the village folk in Sinharāja is not different from the above. Sinharāja is abundant in folklore, traditions and various

beliefs concerning these elephants too. Further, the majority of villagers has an awe-inspiring attitude on them.

“These animals belong to the high class of elephants¹ (*Saddantha Kula*). They are very strong, brave and wise. The body structure and behavior of these elephants show the nature of that caste of elephants. I do not have any doubt about that. The white elephant is the vehicle of *God Sumana Saman*. No one can harm these elephants because God is protecting them and elephants are protecting the Gods’ ground” (SSI03.Villager from, *Pothupitiya* village – 2016.08.20).

Their protest demonstration against the removal of the two elephants is a shining example in this regard. The extinction of elephants in Sinharāja also amounts to an extinction of various other elements which nourish varied fields of the consciousness of people. Such an action creates a void not only in the sub-culture of the place but also that of the greater culture. With such an action, the corpus pertaining to elephants and tuskers which has been handed down from generation to generation and which could of course, be much useful for the management of the human-elephant conflict will retard the nourishment and it will become a part of history.

“I have been working here since 1997 for 17 years. I saw the two elephants for the last time on 05th of Jan. 2015. Although they say there are three elephants, I have never seen all three together. When the one with short tuskers comes to the bungalow you feel that the other two are also in the vicinity. Because once they come here, they spend two or three weeks before they return. Whatever it is and wherever they are after November when December and January approach they definitely come. When they come to Morningside, we meet them at Tamil Kovil where they surely come. The elephant does not allow any buildings to be put up there. The elephant breaks it. Tamils believe that it does not let anybody defile the place.” (FGI04. Laborer from the Forest Department, Morning Side - 2016.08.19).

7.5 Laws, Policies and Institutional Challenges

Legal protection is afforded to elephants and tuskers in Sri Lanka by the FFPO. Amendment No 49 of 1993 has made provisions pertaining to elephants and tuskers. The responsibility for implementation of these provisions is vested with the Department of Wildlife Conservation (DWC). The FFPO part II has mentioned provision of “Protection of tuskers, elephants, buffaloes, deer and fowl in areas

¹ According to local knowledge system there are ten class of elephants (Deraniyagala, 1952).

outside National Reserves and Sanctuaries” (FFPO). Therefore, this is the department which deals with elephants. The general control of Sinharāja is undertaken by Forest Department (FD) under the Forest Conservation Ordinance (FCO). Moreover, Sinharaja is a site controlled by National Heritage Wilderness Area Act (National Heritage Wilderness Areas Act, 1988). However, the presence of elephants in a forest contributes to the attention and attraction for its conservation and management at various stages, i.e. global, regional, national and local. When institutions such as World Wildlife Fund (WWF), United Nations Environment Programme (UNEP), and International Union for Conservation of Nature (IUCN), United Nations World Heritage Center (UNWHC) pay their attention to conservation of elephants, it mainly concentrates on their habitats. For example, in 2018, Former wildlife minister tried to translocate those elephants due to influence of his political supporters. At that moment, UNWHC forced the SL government to stop it. This case proves the policy and legislation-based importance of these elephants. In many places in the world, elephants are recognized as a flagship species for conservation. The patronage and publicity given by it induce to protect the whole eco-system.

Even the activities of state sponsored community-based organizations such as “*Gaja Mituro*” which can be observed at national level can be taken into consideration. Although their main object is to protect elephant’s law and policies pertaining to elephants, they emphasize the importance of protecting the whole ecosystem in a direct and an indirect way. Therefore, Sinharāja devoid of elephants will go down considerably in attraction and attention.

8. 3rd Phase - Solutions and strategies

8.1 In-situ Conservation

Conservation is of two types, i.e. in-situ and ex-situ conservation. Under in-situ, a certain species is conserved being it in its habitat itself. Under ex-situ, a species under given condition is conserved outside its place (Hamblen, 2004). Concerning the

elephant both these ways are adopted in Sri Lanka. The method we propose with regard to Sinharāja is in-situ. In other words, we propose to confirm their existence within the forest itself, but here, two points come up.

- Are elephants of Sinharāja in a suitable condition to be bred?
- Does it imply the way to prepare a suitable environment?

It is important what Dr. Nandana Atapattu (2012) says regarding elephants of Sinharāja that is relevant to the factor I referred to above.

“Although it is true that taken as a whole breeding efficiency of elephants and tuskers in Sri Lanka is at a high level, one of the two views contradictory to each other adopted in case of propagation and distribution of animals can be utilized to clarify the condition in Sinharāja.

According to that view, natural breeding occurs between male elephants and female elephants if and when a number of she elephants could give protection to the cub to be borne frequently in the herd and in the surrounding area.

Although some 14 elephants were living in Sinharāja in the latter part of 1950 decade when nearly half of them as conjectured are treated as single elephants the rest can be supposed to be a small group. Although those male elephants that frequented the herd were mature, most of them must have been single elephants which had left that herd. In the community of elephants which detest internal breeding among the members of the same group breeding does not occur. Moreover, there is no way for an elephant to migrate to Sinharāja from a place outside which is isolated due to human activities.

In these circumstances the herd of elephants imprisoned in a rain forest full of trees and shrub jungles which is not at all suitable for such massive creatures debarred from migration need of propagating an offspring would not have arisen.

The fact that it took ten years for the birth of the first baby elephant in Pinnawala Elephant Orphanage confirms that the chance of breeding among the tamed elephants in Sri Lanka is slim of which fact in return strengthens the Sinharāja hypothesis” (Atapattu, 2012,p.226).

Accordingly, an offspring of the rest of the elephants that remain in Sinharāja is very unlikely. According to him, all elephants that reside in Sinharāja are “Bull male animals” (Atapattu, 2012, p. 225). This can be analyzed in another way.

“If breeding of any genus is to continue in the population of that being, there must be a definite number of animals. It is called in zoology “critical number.” In Sinhala, it can be termed as “decisive number.” If the population of that animal is lower than “decisive number” existence of that particular animal will tend to diminish regularly and will end up in total extinction. This “decisive number” varies not only according to each and every species but also depends on the nature of the environment in which the

animal lives. No scientist who knows this decisive number which determines the extinction of the elephant is known to exist in Sri Lanka” (Parakrama, 2006:p.17).

Then has the population of elephants in Sinharāja got down to this decisive number or the minimum viable population size? What could be decided in these circumstances is that inter breeding of the present elephants in Sinharāja may not give birth to a new offspring.

Then we must think of the second option for a solution, i.e. how to prepare the necessary ground for the process in question. What must be done is to mix the elephants of Sinharāja with a certain number of elephants of the breeding age under close monitoring. A group of elephants belonging to *Udawalawa* Elephant Transit Home which lead its animals to forests by batches can be trained for this purpose. Training here implies the process done at present at *Udawalawa* near a rain forest (Localities *Potupitiya, Kopikella, Thune Kanuwa, Botiyathenna* where Sinharāja elephants now frequenting can be selected for this work). It can be expected that home range of this group which frequents will adapt to the present forest cover. The Information offered by Sirisena (2013) is important in this respect (See Table 3 & Figure 9). By using GPRS collars or Radio tracing methods, their fundamental niche and home range can be monitored. However, some researchers and responsible authorities are entertaining a negative mindset to come forward to practice new conservation approaches such as habitat enrichment, population enrichment and community conservation.

“These are the last two elephants in Sinharāja. Enriching the population is impossible by means of elephants brought from elsewhere? If at all elephants are to be brought it should be from Adam’s Peak Reserve. It is not practically possible. Even if they are brought here, they cannot get adapted to this environment. Even the food might be a problem.” (TPI03.Wildlife Researcher, Colombo -2016.07.20).

Table No. 03: Sources of Food and Distribution of Those Sources in Respect of Elephants in Sinharāja

Plant Species Consumed by Elephants Name of the plant	Area Where Elephants Frequent				
	Sinharāja	Delwala forest reserve	Beragala forest reserve	Handapan Ella forest reserve	Rakwana hilltop
<i>Ochlandra stridula</i>	«	«	«	«	
<i>Caryota urens</i>	«	«	«	«	«
<i>Derris parviflora</i>	«	«	«	«	
<i>Dalbergia pseudo</i>	«	«	«	«	
POACEAE sp.			«	«	«
<i>Elettaria ensal</i>	«	«			
<i>Tripsacum andersonii</i>					«
<i>Entada pusaetha</i>	«	«	«		
<i>Mariscus paniceus</i>	«	«	«		«
<i>Imperata cylindrica</i>					«
<i>Chromolaena odorata</i>					«
Dwarf bamboo Arundinaria sp.			«	«	

Source: Sirisena, 2013

However, these researchers and responsible authorities must take the lead regarding the conservation of elephants in Sinharaja. In fact, the response of the resident elephants of Sinharāja to this conservation project is also doubtful, i.e. either the reception or the refusal of the new herd. The reaction of the community living around Sinharāja over the introduction of a new herd of elephants to the forest is constructive (Sirisena, 2013). At least an attempt must be made in this connection. As a country and nation fond of and keen on translocating elephants out of their natural habitats, to catch and remove them, to entrap them, and then to make money by exhibiting such entrapped elephants, we must equally pay attention to this kind of project which is of course a moral duty and a responsibility. This kind of projects have been successfully implemented in the world with regard to many species (IUCN/SSC, 2013; Emslie et al., 2009; Dublin, and Niskanen, 2003). It is important to study them as pioneer studies. However, elephants have a strong attachment to their home ranges

as it is related to their fitness (Fernando et al., 2008). Especially it will be difficult for these Sinharaja elephants to adopt to dry zone ecosystems. The forcible removal of elephants from their home ranges greatly jeopardizes their survival (Fernando, 2015). Therefore translocation or establishing an elephant holding ground is not a suitable and scientific approach to ensure existence of the population of Sinharaja elephants.

8.2 Sustainable Forest Conservation and Management

Although Sinharāja Forest has been declared as a World Heritage Forest Reserve and accordingly administration has been performed, incidents connected with deforestation and forest degradation are being reported. These activities mostly take place particularly in forests surrounding Sinharāja where elephants frequent. To regulate these circumstances several methods can be taken. i.e.

- i. Proclamation of forest lands surrounding Sinharāja as forest reserves and adjoining them with Sinharāja

Sirisena (2013) describes the localities of Sinharāja where elephants frequent and their time limits. What is evident from this is the importance of peripheral forests for conservation of elephants and the importance of stopping processes of deforestation and forest degradation. He (2013) has arranged eco-systems most suitable to elephants of Sinharāja according to the nature of forest cover. Accordingly, importance of peripheral forests is highlighted. Elephants mainly use such restricted, ephemeral and seasonal habitats corresponding to ‘forest edge’ in mature forests. (See Table 03) In such forests, elephants occur at low densities of about 0.2 elephants/km² (Sukumar, 1989). Therefore, there is an urgent need to conserve the elephants’ home range lying across adjoined forest patches as well (Ranukkanda et al., 2018; Ranawella, 2018; Lakmali, 2019).

Table No.04: Annual Migratory Pattern of Elephants in Sinharāja

Area Where Elephants Frequent	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul.	Aug.	Sept	Oct.	Nov.	Dec.
Sinharāja Forest		o	o	o		
Delwala Reserve	o	o										o
Beragala Reserve				o	o	o	o	o				
Handapān Ella Reserve				o	o	o	o				o	
Rakvan Hilltop		o	o	o								o

Source: Sirisena, 2013

- ii. Put an end to processes of deforestation and forest degradation that occur in peripheral forests and Sinharaja.
- iii. End the blocking of elephant corridors and establishing permanent wildlife corridor.
- iv. Implementation of combined programs by Forest Department, Department of Wildlife Conservation and the police to regulate illegal activities.
- v. Providing these agencies with human resources, physical resources and knowledge they need to achieve their targets.
- vi. Promoting natural science and social science researchers to conduct research about Sinharaja elephants and use their outcomes for the policy process.
- vii. Obtaining assistance of non-governmental organizations of national and international level to promote conservation applications.
- viii. Establishment of community-based conservation movements around Sinharāja and creation of opportunities for distribution of management responsibilities, opportunities, profit and benefit.
- ix. Bending continually on integrated conservational and management approaches and fulfilment of their objectives at grassroot level.

By following these strategies deforestation and forest degradation that occur in Sinharaja and surrounding forests can be controlled and it will directly create an environment specially favorable for the existence of elephants and also will pave the way for minimization of the human-elephant conflict.

8.3 Mitigation of Human and Elephant Conflict

What is evident from the observation of the clash between man and elephant in Sinharāja is that the human activities are the stimulus behind the fury of elephants. Because of such doings loss of life and property takes place. For instance, obstruction of elephant's migration paths, illegal activities carried out inside the forests and provocative activities such as chasing elephants, assaulting them with flambeau and burning ash provoke these animals. The action must be taken immediately to stop these activities, to make awareness in the community and land use planning. Establishing the permeant Wildlife Range office at *Manikkawatta* area would help to stop wildlife crimes and manage the conflict. To control the prevailing condition, distribution of thunder flash will be suitable. The community must be made aware of areas abundant in elephants and time and places where they frequent and employing officials to observe the phenomenon can be done. More fruitful and efficient step is to seek assistance of community movements such as "*Sinharāja Sumituro, National Environmental Foundation*" which comprise young people. Whenever elephants arrive at villages and roads, community and officials can be made aware of such matters by establishing social networks equipped with mobile phones through which such matters could be communicated. Then necessary action could be easily taken, and the injuries could be avoided. Tracking elephants with radio or GPS collars is another advanced method to mitigate the conflict. Though this method is somewhat expensive and needs expert knowledge; it will help as a long-term solution for the problem. Moreover, Mobile phone-based communication system, manual or automatic warning system would be effective with maximum community commitment and understanding.

"Rather than relocating elephants into one dry zone area where they are certainly going to perish in a very short time. The best option is to have radio collars on these two elephants' two radio collars and one monitoring station to monitor this" (TPI04. Senior environmentalist and advocate, Colombo - 2018.06.15).

"We do not want the elephants to extinct. If it happens you know the way they clear and fell the forest won't last long. What has happened is that the elephants cannot live in the jungle due to human action. Wild Life Office is at *Delwala*. It is neither where the jungle is nor where the animal frequents." (SSI05. The president of local environment conservation, Kalawana - 2016.08.19).

Yet another alternative is to grow crops that are repulsive to elephants and erection of bio fences along the boundary where elephants frequent. As the number of elephants is very decisive, by creating active community groups with first-hand knowledge, the clash between elephant and man can be regulated by 95%. Countries such as India, Thailand, Nepal and Africa have successfully implemented such projects which have strong scientific foundation and conservation commitments on various species (Banks & Burge, 2004; Kamuti, 2013; Bhatta & Shrestha, 2015).

8.4 Community Conservation

The community conservation has become an integral part of biodiversity conservation (Barrow & Murphree, 2001). It is an approach of sharing responsibilities and benefits of conservation. Many regions in the globe, have practiced this approach with their unique identities associated with traditional knowledge systems (Hulme & Murphree, 2001).

The elderly men and women having lived in the surroundings where elephants frequent possess a lot of experience. By adopting this traditional knowledge, they could either prevent elephant from harming them or impede and thus put off the clash. But with the population explosion and introduction of tea cultivation during recent times, these people have come to be engaged in other means of livelihood detrimental to environment (such as felling, removing some plant species, illegal mining, and illicit distilling, etc.)

As a result, some people are abandoning the attitude that the elephant is also a part and parcel of the environment in which they live and have come to treat the animal as his enemy, a pest and a destroyer. The reason is that the elephant is an obstacle to new modes of living. This mode of thinking can be identified as an unfavorable element in the face of the combat between man and elephant in this region. The knowledge and especially the understanding which the community has possessed of the elephant must be made use in management of the human-elephant conflict. However, the modern management planning has excluded the knowledge and comprehension, man has of the elephant. On the other hand, community-based programmes such as “*Gaja Mituro*” implemented in other Wildlife zones in remedying combat of man with elephants and even in community-based programmes in Sinharāja, they use higher potential of the traditional knowledge of the community.

8.5 New Laws, Policies with Institutional Integrated Approach

Policy development and implementation is one of the main strategies of conservation (Brown, 2002; Leader-Williams, 2010). What is meant here is the legal procedure that makes provision for implementation of new conservational strategies. The conservational strategies are to be adopted with a view to adding new female elephants so as to maintain elephant population in Sinharāja. Although this is a topic which will probably lead to a dispute, still it must be considered with importance. At least the first step must be discussed in this regard. Such a beginning will yield useful results in future. In addition, implementation of current legal procedure will help reach a better approach.

9. Conclusion

By now, the population of elephants living in wet zone of Sri Lanka is restricted to Adams Peak Reserve and Sinharāja. In spite of that, no definite information about the population of elephants in Adam's Peak forest is available. Some wildlife officers and villagers report that among them inter breeding takes place. By now (2016), the reports that come from Sinharāja say that there are only two male elephants there. Both of them are adult males. A third individual referred to as “mother elephant” by village folks has not been reported for ten years. If she had a natural death or perished due to human activities, the population of elephants in Sinharaja would already come down to two. But as it has been already discussed, extinction of elephants in Sinharāja does not mean to say that it is only the end of a certain fauna species, because elephants play a significant role with regard to a number of other disciplines such as ecological, socio-economic, and cultural, legal and spiritual aspects.

According to current situation, the extinction of elephants in Sinharāja will raise new problems and challenges in different fields and current issues will be more complex and crucial. This study suggests and recommends enriching the population by introducing a new herd of female elephants and implementing in-situ conservation methods to conserve elephants in Sinharaja forest. Although decisive obstacles will arise when implementation is put into effect, decisions must be taken to conserve these animals and to protect the equilibrium of the environment ignoring whatever obstruction crops up. It will open the door even for conservational and management discourse to ignite the concern of masses.

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