

# From Conflict to Coexistence: A Critical Look at Issues Related to Human-Wildlife Interactions in Sri Lanka

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**Abstract:** *Sri Lanka is appreciated for its natural beauty and its biodiversity as being one of the hot spots in the world. Its picturesque environments are a great asset to its people and the abundance of wildlife resources it has is second to non-other. However, due to the increase in the struggle between the wildlife and human beings, this escalating conflict has resulted in violent interactions between the two, where both the parties have made the ultimate sacrifice with their lives. In particular, the Human-Elephant and Human-Crocodile conflict has created much controversy from socio, economic and political aspects in the country. Therefore, this research is focused on suggesting methods of turning this conflict between human beings and the wildlife in to one of coexistence with a critical review of literature and the study reports that have been produced both locally and internationally by using a qualitative method. The results reveal that, the conflict is more diverse than one might think as the conflict has now become human-wildlife-human conflict, where there is a conflict between who are trying to save the wildlife from the humans and the others who are trying to save their lives and crops from the wildlife. This triparty conflict has made matters very complicated and therefore, it is suggested that the existing laws and regulations be amended and be made more realistic in order to protect both the wildlife and the human beings of the country, where the existing rules and regulations of the British Era has taken a more biocentre approach which seems unworkable in the modern times.*

**Keywords:** Environmental Sociology, Human Wildlife Conflict, Sri Lanka

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## 1. Introduction

Sri Lanka being a country located near the equator enjoys a rich variety of species and plants for a small island nation. Despite its small size, Sri Lanka has a rich ecosystem diversity because of its topographic and climatic heterogeneity as well as its coastal influence (Gunatilleke, Pethiyagoda, & Gunatilleke, 2008). While the environmental riches in the country makes it one of the most beautiful places in the world to live in, in the last few decades, its environment and biodiversity is seriously threatened with the conflict between the human and wildlife in the country which has resulted in the loss of wildlife and humans at an alarming rate, especially the wildlife.

The conflict between the humans and the wildlife has directly resulted from the encroachment of space by one against the other. Between 1990 and 2010, Sri Lanka lost an average of 24,500 hectares or 1.04% of its forests per year. In total, between 1990 and 2010, Sri Lanka lost 20.9% of its forest cover, or around 490,000 hectares (Food and Agriculture Organization of the

United Nations, 2020). The loss of habitat results in wildlife moving towards human settlements and then issues and conflicts will result. Loss of habitat also means that humans and wildlife will have to compete with one another in order to find food, this also creates conflicts between the two. The main problem regarding this problem is the way it is resolved, where either the humans or the wildlife must pay the ultimate price by sacrificing their lives in this never-ending straggle.

The human wildlife conflict is not a two-way conflict between the wildlife on one side and the humans on another. Instead, it has become a three-way conflict where humans have also come into conflict with one another since one group of individuals are trying to protect the wildlife whereas the other group of people are trying to save their livelihoods and their lives. In this context, the human wildlife conflict has not become an easy task to be resolved. The problem has become more serious in developing countries since the value of human lives and that of the wildlife has not been properly respected where the issue is brought up as a topic for political gains rather than resolutions.

### **1.1 Objective of the Study**

Human Wildlife Conflict (HWC) has become a pressing issue for the environmentalist, sociologist, law makers and policy makers alike. HWC has become a difficult issue to solve due to the number of people and institutions who are involved in the process of mitigating this HWC. Therefore, the main objective of this study is to identify the possible solutions that could be utilized from a Sri Lankan context to mitigate and possibly eradicate the HWC that has taken the lives of many humans and other species alike in the country. In doing this, this paper firstly introduces the nature of the HWC, reasons behind for the HWC, the theoretical underpinnings related to the issue along with the issues that are prevalent in the country and finally proposing possible solutions that could be introduced at mitigating and eradicating the HWC.

### **1.2 Methodology of the Study**

This study was carried out using a qualitative method where the issue of human wildlife conflict was analysed using secondary data made available by other researchers. A thorough literature review was carried out and specific themes related to this discourse were discussed in the study. In identifying the specific themes in the discourse, the analysis was focused on the areas of political ecology, cultural ecology and social ecology, wherein these theoretical discourses were critiqued and analysed for better explaining the human wildlife conflict. In studying the Sri Lankan context, the study was limited to two specific conflicts related to the human elephant conflict and the human-crocodile conflict. After this analysis, the final parts of the study analyse the possible solutions for mitigating and eradicating the conflict which includes both lethal and non-lethal approaches.

## **2. The Nature of Human Wildlife Conflict**

A conflict arises when there is a disagreement between two parties concerning a thing, idea or belief or where the parties are unable to come to a common term. In the case of human wildlife conflict, the problem is more acute since it is obvious that wildlife and humans are unable to have a discussion and resolve their differences. Therefore, the protection and the wellbeing of the animals must be taken up by humans themselves on their behalf. Since humans are both representing themselves and the wildlife, they are at cross roads in resolving this dispute in an amicable manner.

According to Madden ‘human-wildlife conflict occurs when the needs and behavior of wildlife impact negatively on the goals of humans or when the goals of humans negatively impact the needs of wildlife. These conflicts may result when wildlife damage crops, injure or kill domestic animals, threaten or kill people’ (Madden, 2004). According to Hill (Hill, Webber, & Priston, 2017) the term ‘human-wildlife conflict’ is commonly used in the conservation literature to denote negative interactions between people and wildlife, for example, where wildlife damage property including crops, or threaten the safety of livestock or even people. For many researchers interested in the conservation implications of these negative human wildlife interactions, the entry point is a concern for wildlife. Consequently, the focus is often on what the animals do, and what people complain about. This perspective has, until very recently, dominated research and the design of conflict mitigation strategies. However, it is increasingly apparent that human-wildlife conflict is normally better understood as conflicts between different human groups, sometimes over how wildlife should be managed, but expressed as a clash between human and wildlife needs and activities. She further explains that, researchers are labelling these human-wildlife conflicts as wicked problems. A ‘wicked problem’ is one that is challenging or seemingly impossible to solve because of incomplete, contradictory, and changing requirements that are often difficult to define. Such problems are characterized as multifaceted, involving multiple stakeholders who hold conflicting perspectives and values. Accordingly, these problems are hard to describe, tend to recur and may change in response to any attempt to solve them.

The human wildlife conflict is not an issue which is faced by the countries in the developing world. Countries in the so-called developed world are also facing similar or if not more acute problems regarding the human wildlife conflict. Therefore, this issue or the problem has truly become a global one and one would be required therefore, to do a comparative study on the differences in issues and problems faced by both the countries in the developed world and the non-developed world to see the similarities and distinguishing facts regarding the two. Another feature that can be seen regarding this conflict is the mitigation attempts that have been taken focuses more on the value of the human lives and property instead of the wildlife. According to Hill (Hill, Webber, & Priston, 2017) mitigation attempts to date mostly focus on developing technical solutions to reduce the negative impacts of wildlife behaviour on human property or safety, without recognizing or addressing underlying social conflicts. Consequently, they are rarely fully successful in addressing these conflicts.

### **3. Theoretical Approaches to the Human Wildlife Conflict**

How societies view wildlife determines the outcome of human–wildlife interaction and, depending on the context, translates into a coexistence, neutral or conflict situation. Throughout history, the social meaning of wildlife has changed, shaping the role and the place wildlife hold in different societies, from beloved pets cherished at home (e.g., dogs) to despicable vermin to be eradicated from the wild (e.g., wolves). For example, white-tailed deer (*Odocoileus virginianus*) coexist and are often tolerated within urban human settlements in North America. Yet those species perceived as a threat (e.g., coyotes *Canis latrans*), or pest (e.g., raccoon *Procyon lotor*) or with deep-rooted social meaning, as in the case of the big bad wolf of Little Red Riding Hood fame in Western cultures, can be rejected by society, potentially turning an encounter with such species into a conflict situation (Vagra, 2009).

Human–wildlife conflict has emerged as the central vocabulary for cases requiring balance between resource demands of humans and wildlife. This phrase is problematic because, given traditional definitions of conflict, it positions wildlife as conscious human antagonists

(Peterson, 2010). Human–wildlife conflict (HWC) is pervasive in both developing and developed countries. HWC occurs frequently in rural areas and has become common on the urban fringe. The conflict is not limited to selected species, but rather involves a variety of mammals, birds, fish, insects, and reptiles. Despite the diversity of situations and species that spawn HWC, there is one common thread: the thoughts and actions of humans ultimately determine the course and resolution of the conflict (Manferdo & Dayer, 2004).

Human–wildlife conflict has significant consequences for human health, safety, and welfare, as well as biodiversity and ecosystem health. Impacts on humans can be direct or indirect. Human injury and death can result when animals bite, claw, gore, or otherwise directly attack people; during collisions between animals and automobiles, trains, planes, boats and ships, and other vehicles; and from the transmission of a zoonotic disease or parasite. Conflict with wildlife can cause direct material and economic damage to crops, livestock, game species, and property. Indirect impacts of conflict, more difficult to measure, include opportunity costs to farmers and rangers associated with guarding crops or livestock, diminished psychosocial wellbeing, disruption of livelihoods, and food insecurity.

Human–wildlife interactions vary on a continuum from positive to negative, in intensity from minor to severe, and in frequency from rare to common. Attacks on people by apex predators such as tigers, lions, and sharks are now relatively infrequent but the attacks can be lethal and lead to strong public reactions. Conversely, conflict between people and common garden pests or birds such as geese may be more common but provoke less concern. Conflict frequency can also be highly variable within and among geographic regions. Some households or farms within a community may suffer little damage whereas neighbours may experience a surplus killing event in which a predator may kill many animals in one attack, or some properties may be better protected than others (Nyhus, 2016).

### **3.1 The Political Ecology of Human-Wildlife Conflict**

Political ecology is the study of the intersection and relationship between the political, broadly understood, and environmental and ecological phenomena. Political, economic, social, and cultural forces affect, and are affected by, ecological and environmental trends. Because human institutions penetrate the natural world, and nature (changed and unchanged by human activity) affects human life and institutions, this complex and dynamic relationship has everything to do with global justice (Minch, 2011). Political ecology is an approach to understanding the political, economic, and social factors that help shape human-environment relations, including those related to conservation, and the various discursive and material practices used to create protected areas (Massé, 2016). Thus, political ecology attempts to link an understanding of the logics, dynamics, and patterns of economic change the politics of environmental action and ecological outcomes, a set of relationships fundamental to conservation (Adams & Hutton, 2007). The idea of wilderness as a positive statement of the value of lands free from human presence and believed un-transformed by human action has long been a powerful motivator of conservation action.

As one of the solutions for mitigating or eradicating the human wildlife conflict has been to preserve or isolate the wildlife from human interference through conservation efforts where the wildlife is isolated into national parks or conservative areas which are often declared by law to be areas in which human activities are either limited or totally prohibited. The discursive production of conservation areas entails practices that represent, imagine, or “conjure” these spaces in a certain way and throughout the history of conservation and its related displacements has been the conjuring or representation of spaces as ‘pristine’ nature

or ‘wilderness’, both of which see ‘nature’ as separate from and excluding resource or agricultural-based communities, livestock, and related livelihood activities. The conservation approach is mainly focused on protecting the wildlife from the humans and it therefore ignores the rights and interests of the humans. As a result, it has failed to bring about a viable solution for the human wildlife conflict in both the developed and developing countries alike.

Wilderness and conservation landscapes may also necessitate their deliberate material creation through processes aimed at physically transforming the space or landscape in question. Such practices include legislative and policy changes that seek to mediate human-environment relations such as prohibitions on the killing of animals for hunting or other purposes, and restrictions on activities like agriculture, livestock rearing, and the collection of natural resources. How such changes in human-wildlife relations might contribute to HWC and problems of crop destruction, livestock predation, and disease transmission from wild to domestic animals deserves more attention given the devastating consequences such conflict can have for subsistence-based communities, especially those who rely heavily on livestock and livestock-based livelihoods.

The conservation attempt is based on the idea of deep ecology which promotes the inherent worth of all living beings regardless of their instrumental utility to human needs, plus the restructuring of modern human societies in accordance with such ideas. It believes that humans must radically change their relationship to nature from one that values nature solely for its usefulness to human beings to one that recognizes that nature has an inherent value. However, this has not become a viable ideology when considered from those who must constantly struggle with the nature in their survival where the laws and institutes are taking a much conscience effort in protecting the wildlife rather than the humans. This inevitably leads to confrontations among those who are entrusted to protect the wildlife from the people and people who are struggling because of these measures that are taken for the protection of the wildlife.

### **3.2 The Social Ecology of Human-Wildlife Conflict**

Social ecology claims that the environmental crisis is a result of the hierarchical organization of power & the authoritarian mentality rooted in the structures of our society. The Western ideology of dominating the natural world arises from these social relationships. The core principle of social ecology is that ecological problems arise from deep-seated social problems. Ecological problems cannot be understood, much less resolved, without facing social issues. The ecological damage done by our society is more than matched by the harm it inflicts on humanity. Social ecology emphasizes that the destiny of human life goes together with the destiny of the non-human world.

So-called human-wildlife conflict is often the physical expression of socio-political human-human conflict and is influenced by existing social systems. Conservation initiatives can be drawn into such conflicts by focusing on protecting animals as opposed to human settlements. Any attempt to understand livestock depredation must, therefore, adopt a socio-ecological angle by identifying the interactions of livestock husbandry and ecological factors. Community and individual risk awareness need to be contrasted with robust depredation records to promote evidence-based decision making and potentially reduce depredation (Dunnink, 2019). The need for social-ecological integration is readily apparent in the management of human-wildlife interactions (HWIs), defined as the spatial and temporal juxtaposition of human and wildlife activities where humans, wildlife, or both are affected. Although HWIs are the direct result of human and/or animal behavior, numerous social and



ecological factors contribute to the conditions shaping those behaviors, defying single-discipline explanations of causal mechanisms (Dickman, 2010). Understanding the complexity of drivers of HWIs is critical, as the value people place on these interactions ultimately provides the foundation for wildlife conservation and management, whether people want to see interactions enhanced (e.g., increased hunting opportunity, recovery of endangered species) or reduced (Lischka, 2018).

When one considers the HWC from a third world perspective in particular, the damage caused upon the wildlife is resultant from the demand for some of the animal products which are highly valued in others parts of the world such as the Rhino horns and Crocodile skins. Pouching and game of animals for adventure also provide some evidence of the social conditions in which the value of wildlife is undermine in return of foreign exchange through tourism and leisure.

### 3.3 The Cultural Ecology of Human-Wildlife Conflict

Cultural ecology is a theoretical approach that attempts to explain similarities and differences in culture in relation to the environment. Highly focused on how the material culture, or technology, related to basic survival, i.e., subsistence, cultural ecology was the first theoretical approach to provide a causal explanation for those similarities and differences. Human–wildlife conflict is one of the most critical threats facing many wildlife species today, and the topic is receiving increasing attention from conservation biologists. Direct wildlife damage is commonly cited as the main driver of conflict, and many tools exist for reducing such damage. However, significant conflict often remains even after damage has been reduced, suggesting that conflict requires novel, comprehensive approaches for long-term resolution. Although most mitigation studies investigate only the technical aspects of conflict reduction, peoples' attitudes towards wildlife are complex, with social factors as diverse as religious affiliation, ethnicity, and cultural beliefs all shaping conflict intensity. Moreover, human–wildlife conflicts are often manifestations of underlying human–human conflicts, such as between authorities and local people, or between people of different cultural backgrounds (Dickman, 2010).

People often base their perceptions and attitudes not only upon facts and personal experiences, but also upon a myriad of factors such as wider societal experiences, cultural norms, expectations, and beliefs. These social factors can play an extremely important role in human–wildlife conflict, yet are relatively rarely considered. Animals play important roles in folklore in almost all cultures, and attitudes towards species can be substantially influenced by such means: for instance, mythology about vampirism is related to negative attitudes towards bats, while beliefs that the aye-aye (*Daubentonia madagascarensis*) is a harbinger of doom mean it is often killed on sight, with some people believing that the entire village should be burned down and abandoned if an aye-aye is seen nearby. These perceptions of certain species as innately evil or harmful mean that even if wildlife damage is entirely mitigated, residual fear and antagonism can lead to continued persecution nonetheless. Education can help lessen hostility, but such deep-seated preconceptions tend to be hard to overcome and must be considered in conflict studies. In HWC, culture plays a pivotal role in how animals are seen by the people. For instance, people react more violently towards some animals than others even when both the species cause damage to crops and other means of living. Therefore, in planning to mitigate and eradicate human wildlife conflicts, it becomes important to understand the cultural values and meanings people attribute to animals.

#### **4. The Sri Lankan Situation**

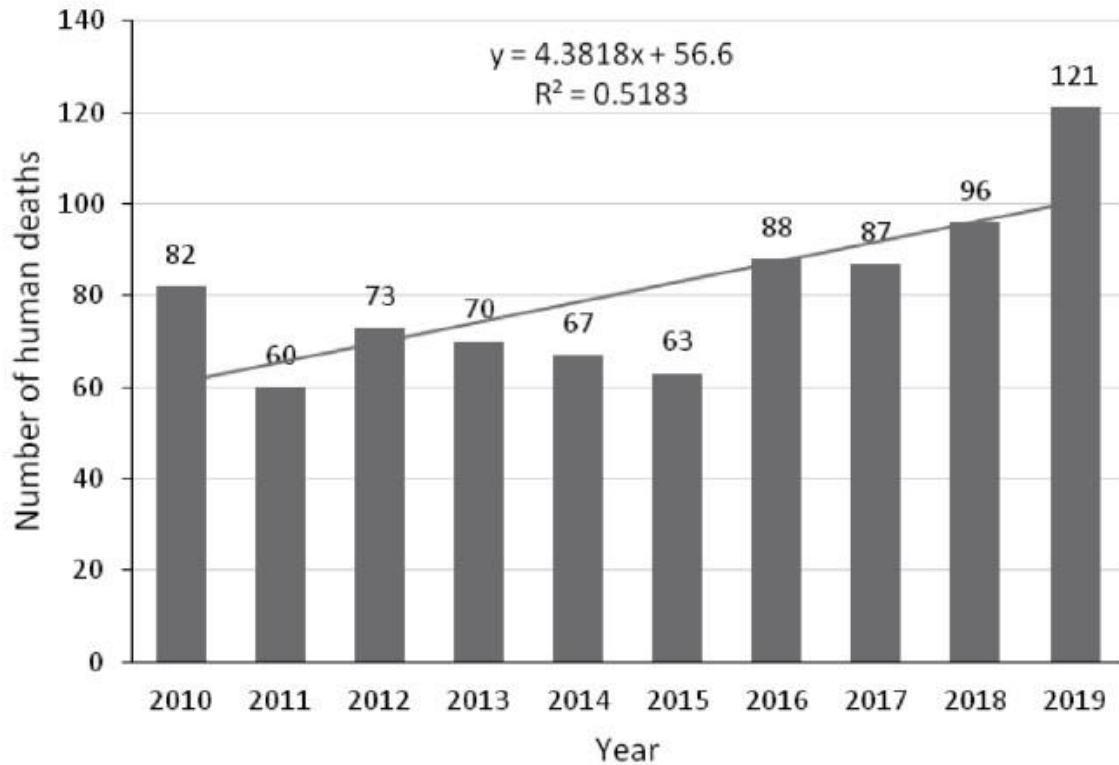
In ancient times the Sri Lankan state protected animals, birds, and other living creatures of the land, pursuant to a moving plea made by Arahath Mahinda, who brought the message of Buddhism to Sri Lanka from India. The first wildlife sanctuary in Sri Lanka was declared by King Devanampiyatissa. As a result, this is now a part of the traditional culture of Sri Lankans who have always had an ethical concern for the welfare of animals and revere all forms of life. However, certain circumstances have forced a section of Sri Lankans to create conflicts with our wildlife.

Sri Lanka is home to a wealth of biodiversity and contains a vast number of species with each playing essential roles in their ecosystems. These animals hold significant environmental, cultural, religious, symbolic, and even economic value that transcends Sri Lanka's borders. For example, some are major attractions for tourists. However, from monkeys to peafowl and from crocodiles to wild boars, many species increasingly find themselves at odds with humans over land, resources, and water, leading to conflict and sometimes violent clashes.

The main issues faced by the Sri Lankan regarding the human wildlife conflict relates to the encounters between humans and the wildlife when they compete for territory, whether it be in the land or in the water. According to Dennis (Mombauer, 2020) human-wildlife encounters have increased rapidly in recent years and go beyond elephants and leopards. Competition has grown over the shared space between humans and wildlife due to encroachment, deforestation, habitat degradation, and climate change, putting humans and animals in conflict over land, water, and resources. Humans often clash with macaques and langurs as the monkeys are attracted by garbage, are being fed or try to find new habitats due to deforestation. Peafowl are emerging as top agricultural pests due to their expanding range and distribution over the last decade. Crocodile attacks mainly affect poorer communities that are dependent on unsafe bodies of water, and they often lack awareness of the animals' behavior. When one considers these conflicts, there is an urgent need to increase awareness around human-wildlife conflict and crop foraging as well as to employ non-violent mitigation measures that consider the interests of both humans and animals, including fences, garbage management and habitat conservation. From a Sri Lankan perspective, the human-elephant conflict and human crocodile conflict can be taken to show the magnitude of the human wildlife conflicts that exists in the country.

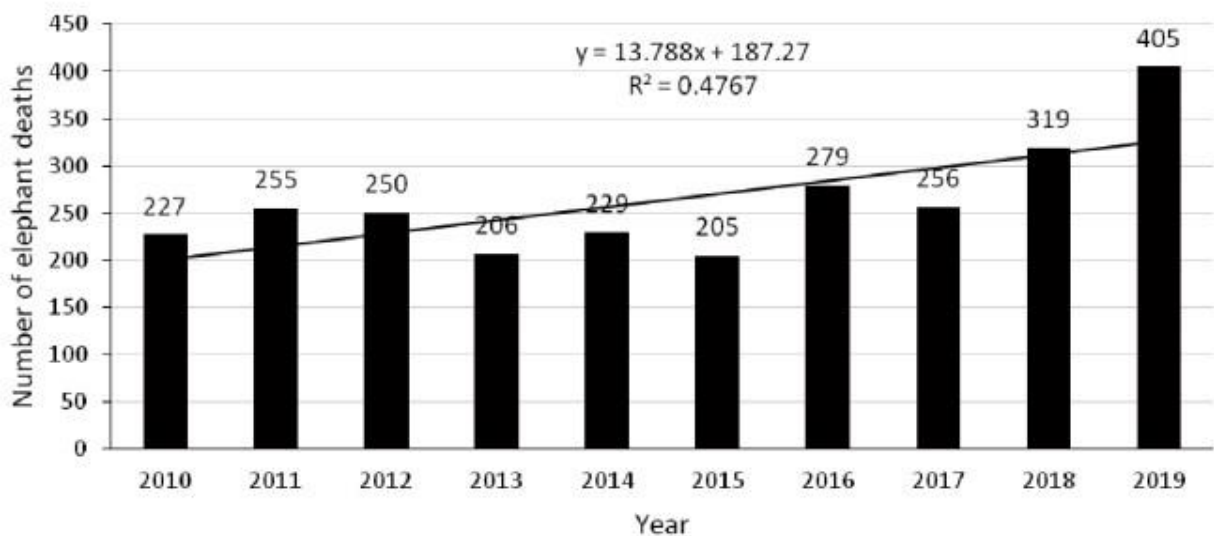
##### **4.1 Human Elephant Conflict in Sri Lanka**

The association between man and elephant in Sri Lanka is ancient. Elephants being the largest terrestrial herbivores require relatively large areas and diversity of environments to forage. With the increase in human population density and changes in the land-use patterns, elephant habitat is being continuously reduced. As a result, much of the present-day elephant range extends into and overlaps with agricultural lands resulting in conflict with man. As both humans and elephants have similar ecological requirements, when both species inhabit the same area, conflict between them is inevitable. Elephants destroy crops, damage houses, and at times even kill people. Irrate farmers in return retaliate by shooting, wounding, or killing elephants with home-made weapons. Hence, the tolerance traditionally shown to the elephant appears to be gradually weakening in farming communities when the elephant interferes with agriculture. Farmers and elephants are coming into conflict resulting in the deaths of both in agricultural areas. Chronic crop damage by elephants, if left to continue unchecked, will have a serious impact on livelihoods of subsistence farmers (Santiapillai, 2010). The following graphs showcases the annual deaths of humans that have resulted from this conflict.



Source: (Prakash, 2020)

The above data is gathered from a study conducted by Prakash (Prakash, 2020) where it is found that 121 people have lost their lives in 2019 due to elephant attacks. According to the data, the number of human casualties due to confrontations with the elephants have also increased. The following graph showcases the number of elephants which have been killed as a result of this conflict.



Source: (Prakash, 2020)

According to the above data provided by Prakash (Prakash, 2020), the number of elephant casualties are early three times or more than the number of human casualties recorded for that



year. In 2019 alone 405 elephants have been killed. While it cannot be said that all the elephants have been killed because of the conflict between the humans and the elephants as some elephants have been killed for ivory and for other elephant parts, the sheer number of deaths alone showcases the tragedy of the elephants. Many deaths due to human elephant conflicts (HEC) are caused by irresponsible behaviour of people, such as approaching wild elephants while inebriated, harassing elephants, and unnecessarily chasing them. Most human deaths due to HEC are preventable if appropriate precautions are taken. Mass media plays a major role in drawing attention to HEC and shaping public reaction to it. Therefore, media should report incidents of HEC responsibly with elucidation and reportage of actual reasons and circumstances causing incidents, rather than sensationalizing them.

HEC has a strong association with Agriculture, which predicts higher HEC incidents during cultivation periods. Sri Lanka has two agricultural seasons. The main season ‘Maha’ is during the North East monsoon from November to February and the secondary season ‘Yala’ is from May to August but may vary between years and regions. Crop damage is perhaps the most prevalent form of conflict across the Asian and African continents. When elephants damage food and cash crops, they affect a rural farmer’s livelihoods. Elephants in large groups can destroy large areas of crops in a single night. While elephants target staple food crops such as rice and maize, furthermore they were attacked to the cash crops such as sugarcane and coconuts. Santiapillai (Santiapillai, 2010) calculated that an average farmer in elephant affected areas of Sri Lanka losses over USD 200 annually for crop damage, while in Thailand, farmer cost of the conflict accounted for 25% of their annual income. Farmers’ lost time for protecting crops and property and compromised family security account for indirect costs. While indirect conflicts do not directly impact livelihoods, they still have a negative effect upon people’s lives.

For example, the fear of running into elephants may restrict people’s movements between villages, especially where attacks have recently occurred. Such fear among children may reduce school attendance, or interfere with the collection of fuel wood and thatch grass, or the collection of wild fruits or other resources (Dharmaratne, 2014).

The tragedy indirectly repercussions for health, nutrition, education and ultimately, development. Attempts at limiting elephants to protected areas by driving them into Department of Wildlife Conservation (DWC) protected areas and fencing them in has been the main approach to HEC mitigation in Sri Lanka over the past 70 years (Fernando, 2015). However, this approach has completely failed and currently over 70% of elephant range is outside protected areas. In an alternative approach, community-based electric fencing to protect villages and paddy fields has been implemented in the North-West with over 50 community based fences being implemented by the Centre for Conservation and Research and the DWC in the past decade.

While the human elephant conflict has always come to the forefront of election promises where the political parties always promise for better protections and compensation schemes for the people who are affected by elephant attacks, they all remain fancy promises made during the elections.

#### **4.2 Human Crocodile Conflict in Sri Lanka**

The Human-Crocodile Conflict (HCC) is recognised as one of the major human-animal conflicts in Sri Lanka, second only to the Human-Elephant Conflict (HEC). The HCC causes detrimental results for crocodiles and human lives, resulting in habitat destruction and

livestock depredation. Most of such incidents are due to saltwater crocodiles, which have been listed as an “endangered” species in Sri Lanka, mainly due to its limited distribution within the island. It is primarily distributed in the Wet Zone of Sri Lanka and some parts of the Dry Zone, and mainly outside protected areas, with a few viable natural habitats remaining. Due to ever increasing human activity, most of these habitats are being cleared of vegetation and altered. Several studies conducted during the recent years suggest that the population is in decline. Human and crocodile have been coexisting for many years in Sri Lanka, particularly close to the Nilwala river area in Matara District, but fatalities were rarely reported. However, during the last decade the threats from crocodiles to humans have enhanced in the Nilwala river area, mainly during the years of 2005, 2008, 2009, 2012, 2013, 2014 and 2015. Some 26 attacks, killing 18 humans by saltwater crocodiles were recorded since 2000 in this area. In retaliation to these attacks, people in this area killed several crocodiles, and recorded the saltwater crocodile under the threatened category in Sri Lanka (Uluwaduge, 2018).

The major threats observed for Saltwater Crocodiles in Sri Lanka were: encroachment of human settlements; habitat loss and destruction (draining and refilling of wetlands, conversion of mangroves and coastal habitats for prawn farms, sand extraction, developing tourist hotels (including high intensity lighting), unplanned road/railway constructions); road/rail kills; and, increased fishing activities in the country. In particular, the removal of riverine forests and the reclamation of swamps directly affect Saltwater Crocodile nesting habits and habitats. Many crocodile habitats are surrounded by fishing villages and tourism zones, and the animals in these habitats are potentially impacted by motor boat activity, oil, noises, garbage, polythene, discarded fishing nets, and fishing tools (Amarasinghe, 2015).

Human crocodile conflict, while not as serious as the human elephant conflict has also resulted in many human and crocodile deaths as reported above. The evidence also shows that there is a possibility that the conflict between crocodiles and humans could escalate due to the changes in the weather patterns, water conditions and the struggle of humans to find water and other resources for their livelihood in crocodile territory.

## **5. Measures for Mitigation and Eradication of Human Wildlife Conflict in Sri Lanka**

A wide range of responses have emerged, broadly categorized as lethal and nonlethal approaches, to prevent conflict from occurring or to reduce the frequency or severity of conflict. These can include activities that are regulated or unregulated and range from methods that require expensive infrastructure or government involvement to methods that can be carried out with low-cost tools by individuals (Nyhus, 2016).

### **5.1. Lethal Control**

Throughout history, lethal control has been a common if sometimes controversial method to manage animal damage. At its most extreme, this has included a strategy of eradication of entire populations or even entire species. Bounties were once widely used to reduce and eliminate predator populations. For example, wolves and cougars were nearly eradicated in the western United States in the twentieth century as a result of predator control programs. Lethal control is now more common to control abundant species, such as coyotes, or to selectively remove aggressive animals that have been unambiguously identified as directly threatening human life. Common methods used to kill animals include firearms, poison, and traps, such as neck snares and rotating-jaw traps. However, when one considers the cultural and religious beliefs and values of the Sri Lankan community, the lethal method does not seem

to be a viable solution since killing animals for the sake of human welfare would not be justifiable.

## **5.2. Nonlethal Control**

Numerous nonlethal approaches are available to reduce conflict, and these approaches are often preferable for species of conservation concern. These include methods to move wildlife; separate wild animals from people and livestock; and use guard animals, mechanical tools, and chemicals to deter wildlife.

### **5.2.1. Translocation.**

Wildlife managers may selectively move wildlife away from locations where conflict is occurring or likely to occur. Numerous species have been translocated to address conflict, including bears, elephants, large felids, wolves, wolverines (*Gulo gulo*) and other mustelids, and even raptors. The success rate of translocations has been typically low and frequently expensive. In Sri Lanka we find this method being used especially regarding the elephants where they are translocated away from the human settlements to reduce the possibility of interaction between the humans and the elephants.

### **5.2.2. Barriers and exclusionary devices.**

Barriers and exclusionary devices are widely used to reduce wildlife damage and can include constructed barriers (e.g., fences) or natural barriers (e.g., planted vegetation). Fencing restricts wildlife to specific areas, restricts movement of unwanted or invasive species, inhibits disease transmission, and protects small, valuable, or highly endangered species. Barriers range from those that are large enough to separate countries and protected areas to those that protect a single community, field, or house, or even smaller areas. Fences can be reinforced with electricity or other cues, such as fladry barriers consisting of flags hanging from ropes to discourage elephants. However, large-scale barriers such as fencing can have potentially serious conservation costs, however, including bisecting wildlife populations, restricting gene flow, changing vegetation, reducing carrying capacity, and increasing local hostility if traditional human movement patterns are also restricted. Large animals such as elephants can damage fences or walk long distances to circumvent barriers, and fence construction and maintenance can be expensive. In Sri Lanka, electric fencing to stop the elephants from entering the villages have failed miserably due to lack of maintenance and coordination between the governmental institutions and their officers.

### **5.2.3. Guarding, restraints, and repellents.**

One of the oldest and most successful methods for reducing conflict is for people to watch over their livestock or crops. The costs of labor and the need for constant vigilance are the key drawbacks of this approach. Some predators, such as lions and tigers, may not be deterred by people, particularly at night or when people venture into carnivore habitat or are tending domestic animals or crops. Throughout history people have modified livestock husbandry practices to protect their livestock. Common strategies (in addition to protective barriers) include changing of planting and harvesting schedules and modification of buildings such as grain storage facilities and barns. While this is one of the more practical, for this to be implemented, it would require the government to teach the techniques and methods that will have to be utilized.

## 6. Conclusion

Human wildlife conflict has become and remains one of the more serious conflicts that must be tackled with caution and care. When one studies the question in depth, it becomes clear that it is not only a conflict between the humans and the wildlife, but a conflict between humans themselves who are at two different ends. Those who face the brunt from wildlife consider it to be a threat to their lives and livelihood while those who are appointed to protect the wildlife see the humans who are threatening or harming the wildlife as something that has to be stopped. The question also becomes more acute since there is no one single solution to stop this conflict, since many of the conflicts that occurs in the globe are unique in their own way. Further to this is the question of finding viable answers to protect the lives and livelihoods of those who are directly affected by the human wildlife conflict where they combat both the wildlife and the authorities. While it would be easy to stop poachers from killing animals with the support of the locals, while it would be very difficult to reconcile with them when wildlife either destroys their crops and houses.

From a Sri Lankan context, the lack of sustained policies along with a lack of political vision for the better management and mitigation of human wildlife conflicts, both the humans and the animals have to pay the ultimate price of sacrificing their lives as being a part of the conflict. The human-elephant conflict is found as the most significant HWC in the country and the measures of fencing and isolating has not worked in reducing the casualties that are reported due to the conflict. In recent times, the human-crocodile conflict, human-leopard conflict and in the last year, the human-jackal conflict made the headlines in the country and the situation is getting worst by the day. Therefore, it is concluded that more stringent methods should be brought about with laws, policies, regulations and institutions which inspire to protect the interests of both the humans and the wildlife, failing which would mean that the conflict would become a never ending one.

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