Journal of the Department of Wildlife Conservation 2014-2:29-39

A GAME THEORETIC SCRUTINY TO HUMAN ELEPHANT CONFLICT

M.G.C. SOORIYABANDARA

Department of Wildlife Conservation

ABSTRACT

Human Elephant Conflict (HEC) in Sri Lanka has been identified as a wildlife conservation issue by the authorities since the inception of the Department of Wildlife Conservation (DWC). At present it has become one of the serious issues faced both by community and authorities. It is quite clear that HEC has a detrimental impact on Sri Lanka's elephant population. Present aggravated situation of HEC cause significant damages to communities through human deaths, injuries, crop and property damages. Elephant population has been affected through deaths of elephants and injuries to elephant. DWC pools annual HEC data of which cause of each recorded elephant death, regional distribution of elephant deaths and age and sex categories of elephant deaths are attributes. As an average 59.86 human lives and 151.29 elephant lives are lost annually; seriousness of the situation is depicted by the growing trend of each of these attributes of HEC. Both elephant and human males are heavily affected, which clearly depicted by 78.74% and 67.0% as averages of male human and adult male elephant deaths respectively. Majority of elephant deaths, 62.08% of total recorded since 1990, are due to the deliberate strategies by people to purge the individual animals engaged in conflict with them. Throughout the history of HEC, authorities have adopted multifaceted effort to resolve the situation. This is attributed with the strategies to contain elephants into the Protected Areas (PAs), repelling marauding individuals away from the human habitations, and compensation for damages by elephants, community empowerment activities, strengthening the legal instruments to thwart crimes against elephants, awareness programmes and research for effective mitigation of HEC. However it is clear that people at individual level continue with the deliberate attempts to eliminate troublesome individuals contributing the highest percentage of causes of elephant deaths. Chronological pattern of the change of strategies at individual level coincide with the introduction of new national level strategic approaches. This results in continuous increase of elephant mortality through deliberate elimination attempts and short term sneaky escapes of the criminals against elephants. Elephants, being in a matriarchal society, lose chance of acquiring the experience of adult males and thereby they are relatively inactive in the game with human beings while people at individual level are very active in the game with the authorities. Therefore, the need at the moment is to control encounters between human and elephants. This may be achieved through managing every category of age and sex of a herd or clan in view of manipulating memory effect of herds and managing newcomer adult males to the population. Above all, for a success story, improved habitat for elephants is a must.

KEY WORDS: HEC, Wildlife conservation, Elephant population, Game theory

INTRODUCTION

Human Elephant Conflict (HEC) has a long history dating back to 1950s, when the inception of the Department of Wildlife Conservation (DWC) took place. Administrative reports of the Wildlife Warden, head of the DWC show alarm at the intensity of this future issue (Nicolas, 1951). With the post-independent, multi-purpose development schemes, elephant habitats were converted into human habitations aggravating the conflict. The intruder, human being, not only made elephant habitats shrunk but made them fragmented and degraded too.

It is not reasonable to conclude that the human being totally ignored the threat faced by elephants. As a parallel approach, to compensate the space lost due to anthropogenic

activities, new protected areas were declared. Figure 01 Shows that with the shrinkage of land area under the natural habitats, Sri Lankan authorities have taken steps to declare new protected areas, both wildlife and forest, where breakeven point is in very close proximity. Therefore, the availability of natural habitats for elephants has become an established limiting factor at this present scenario.

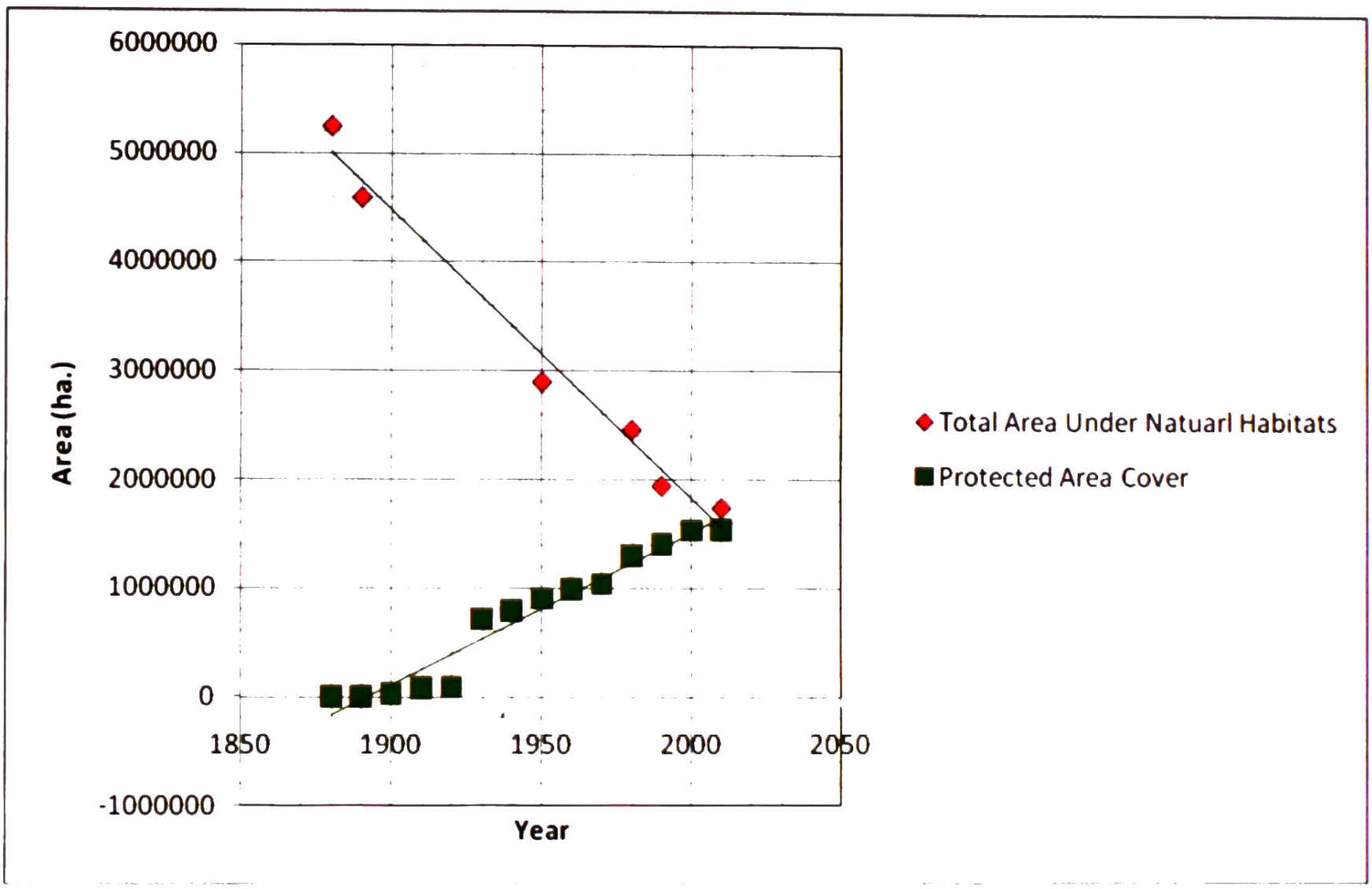

Figure 1. Growth of Protected Area Cover in relation to the Available Natural Habitats

However, those protected areas have not been capable of providing the total protection for the home ranges for elephants, as the priority was given for selection of land for development activities, overlooking the necessity of overlapping ecological boundaries of elephants with the legal boundaries of protected areas.

At present, human deaths, injuries and property and crop damages due to HEC are borne by human society while deaths and injuries are borne by elephants. As far as the data, information and the nature of this work are concerned, to draw a conclusion, relatively more reliable data is available only for human and elephant deaths. Therefore, deaths of both human and elephants due to HEC were taken for this analysis.

Human Deaths: Annual total number of human deaths shows an increasing trend in the early years, whereas in the recent past the annual figures show no such trend.(Figure 02). As the males are more active than females and children in their social and economic life they are highly vulnerable to deaths due to HEC (Figure 03).

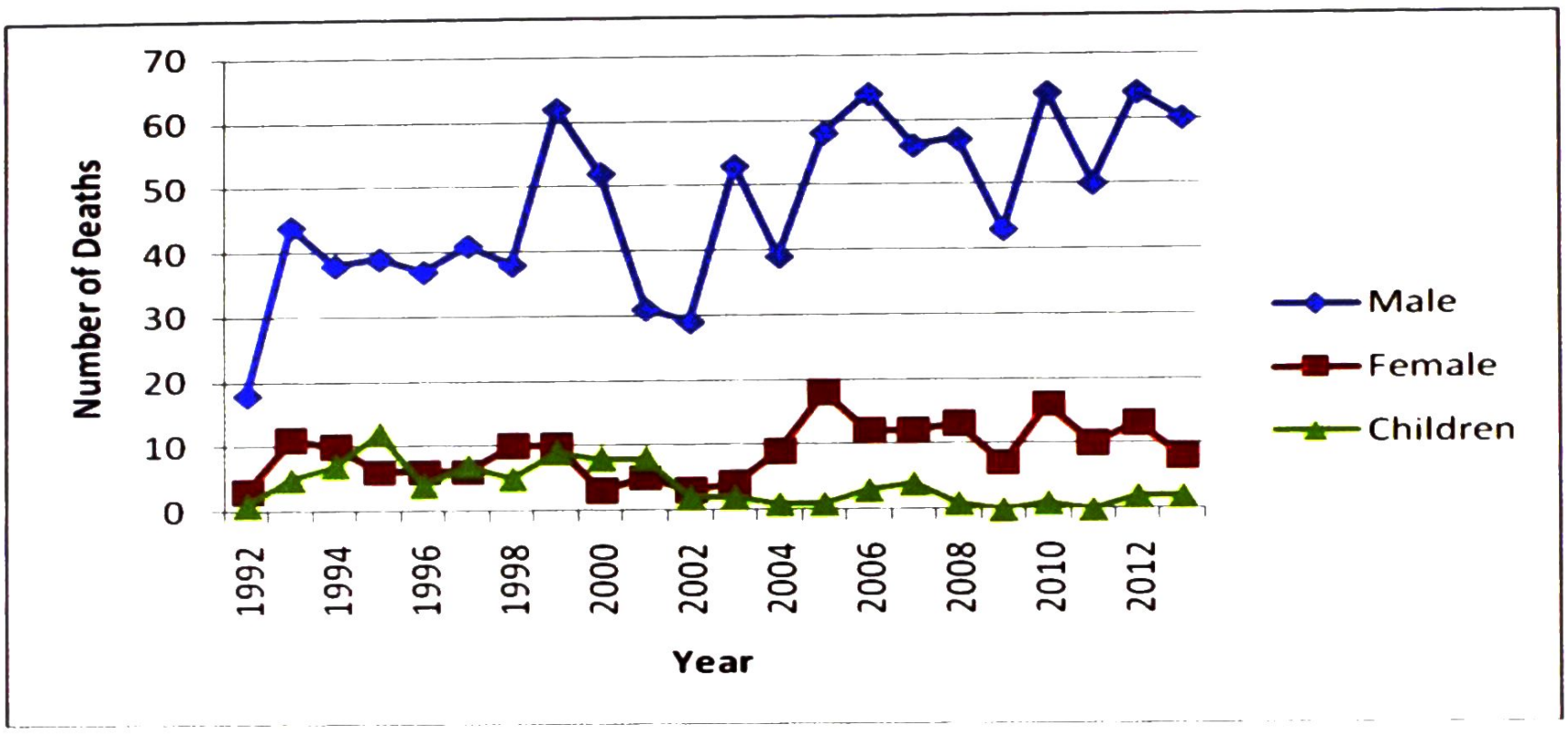

Figure 2. Annual Number of Human Deaths due to HEC (1992-2013)

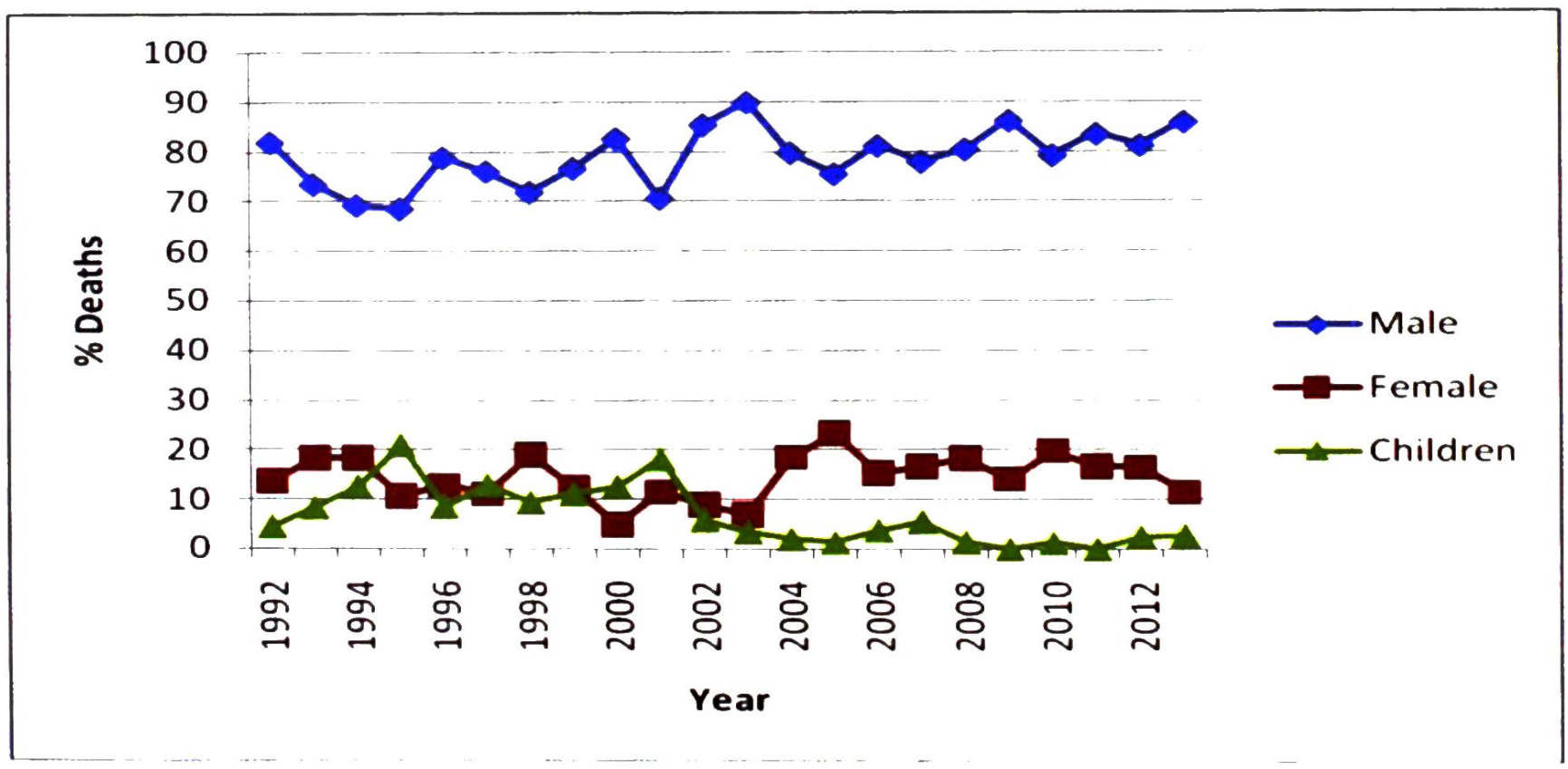

Figure 3. Annual Percentage of Human Deaths due to HEC (1992-2013)

Elephant Deaths: Showing much similarity to the pattern of human deaths, elephant deaths due to deliberate strategies show an increasing trend in the early years, whereas since 2012 the annual data show a decreasing trend (Figure 04). As elephants are in a matriarchal society, sexually matured males are expelled from herds or clans. As adult males have no obligation in the family group other than mating with females, they roam freely within larger home ranges risking their lives (Figure 05). They are the majority engaged in crop raiding and the other destructive moves attributed to HEC. This behavior can be related to their need to gain a quick physical strength, in order to move up on the hierarchical ladder and achieve dominance among the males in the

population. As a result, adult males are susceptible to deaths due to deliberate elimination attempts by humans.

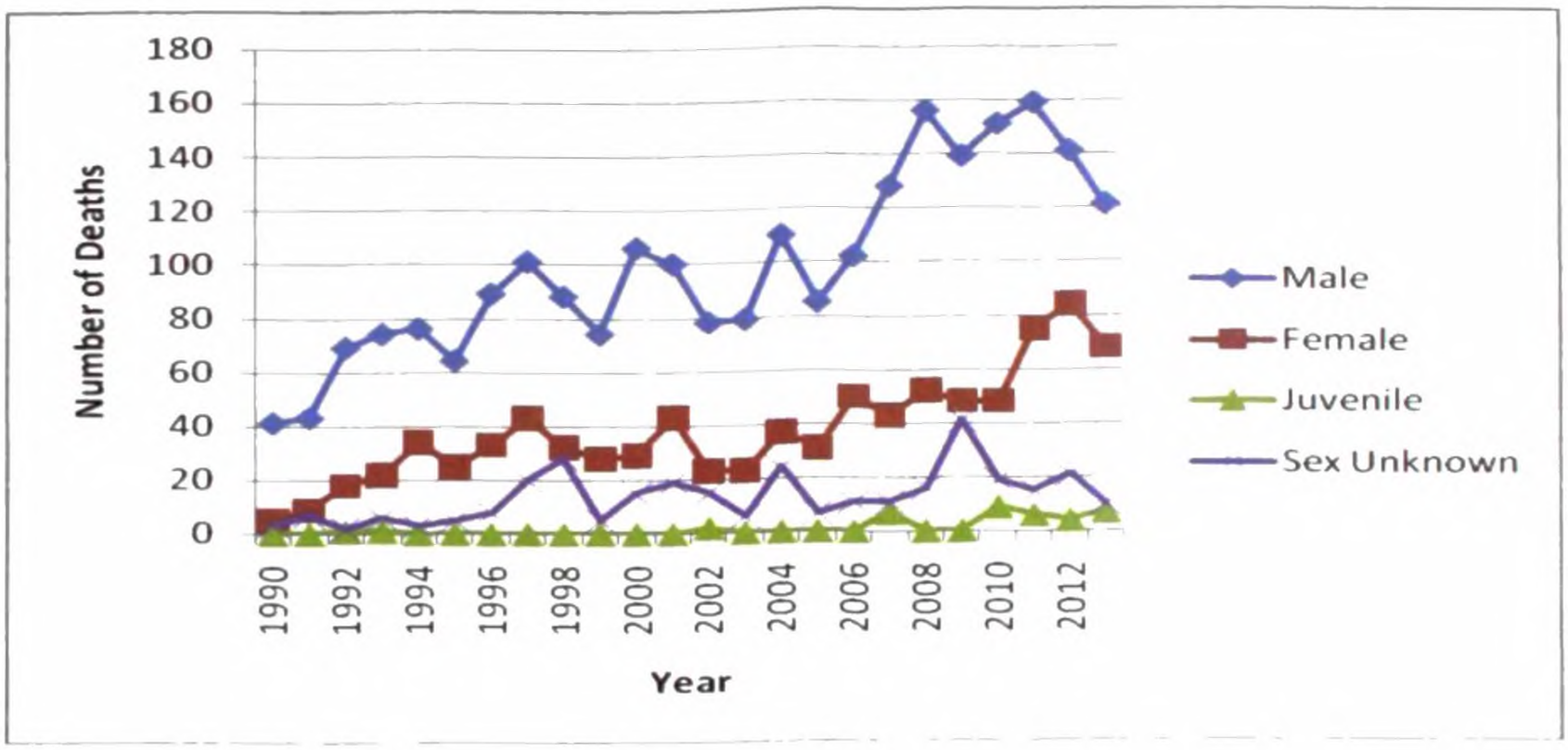

Figure 4. Annual Number of Elephant Deaths due to HEC (1990-2013)

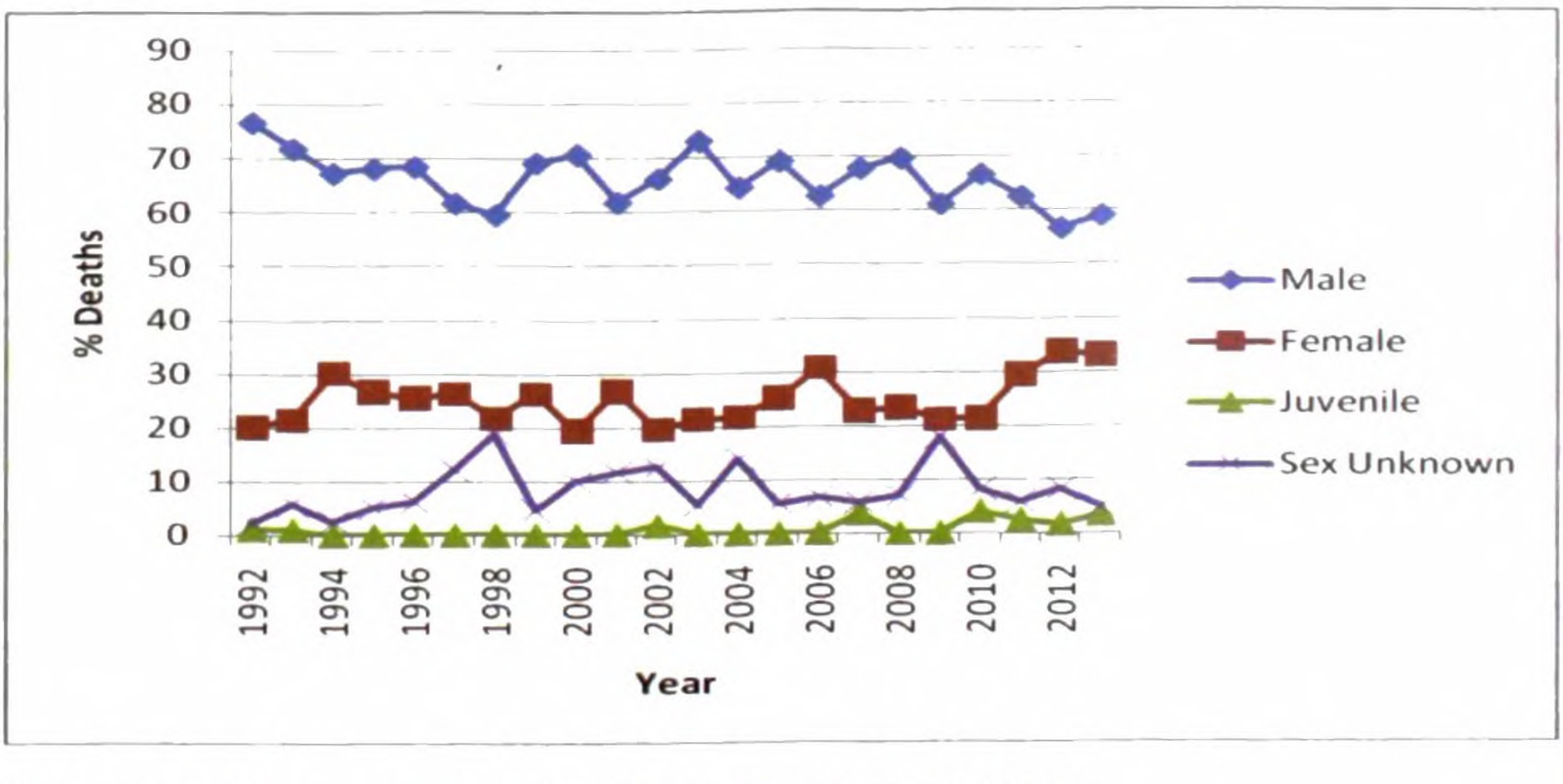

Figure 5. Annual Percentage of Elephant Deaths due to HEC (1992-2013)

Game Situation

At the conflict situation with human beings, elephants seem to develop their own strategies, approaching / advancing for a game situation with humans. Although the data and information on the attempts of elephants to penetrate through the strategic measures set in confrontation to their movements and other events have not been methodically recorded, there are some instances worth noting. According to the records reaching from the field:

1. Elephants tend to neglect the noise of thunder and serpent flares thrown at them to chase away; sometimes they thrash those by foot.
2. Elephants seem to have developed strategies to avoid the electrocuted parts of the electric fences so that fence posts are now covered with live wires; initially used normal concrete fence posts have been gradually replaced by unbreakable timber posts or much stronger and heavy concrete posts; electric fence, initially a psychological barrier, now play an additional role of a physical barrier.
3. Field observations reveal that in some instances elephants put timber logs over the fence wires in order to break them and trespass.

This is an area, the systematic study on how elephants tend to adapt against human strategies, that should be prioritized in future research.

However, it is evident that with the steady increase of HEC, both human beings and elephants show signs of development of strategies to escape from losing situations.

History of HEC shows that the human being has developed strategies to out-compete elephants at this conflict situation, chasing the intruder elephants away from human habitations and repelling elephants from entering human habitations. However, data and information that could be used for systematic analysis are not available on these attempts. Data collected for a longer duration at a required standard in relation to HEC is available for elephant deaths. This data show that majority of elephant deaths in HEC is due to four basic methods of killing elephants, *viz.* shooting, electrocution, poisoning and use of explosives ('hakka patas') (Figure 06). These methods show a sequence of origin, percentage change of the annual composition of methodologies and an increasing trend as a whole (figures 07 and 08).

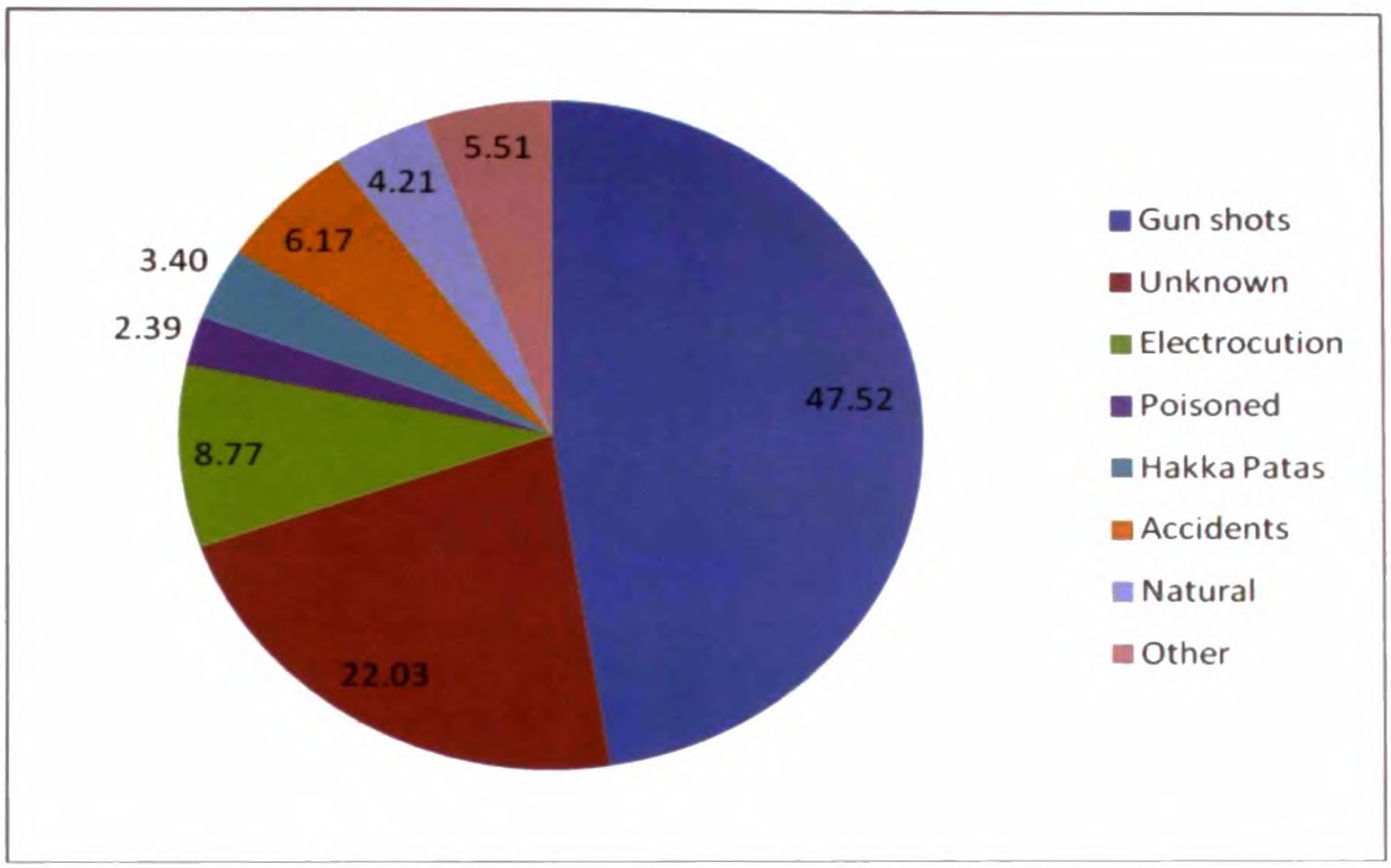

Figure 6. Percentage Elephant Deaths due to HEC (1990-2013)

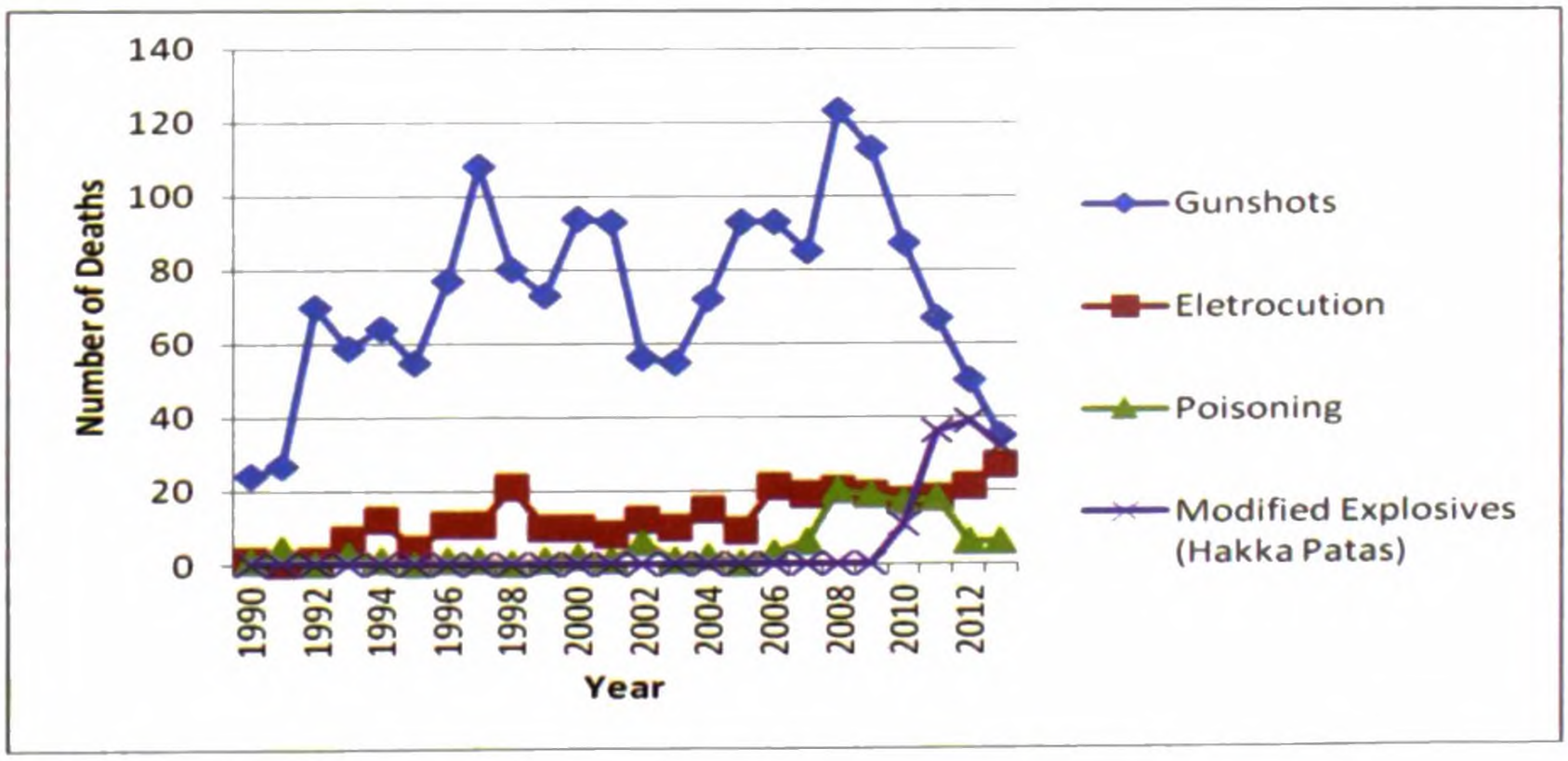

Figure 7. Number of Elephant Deaths due to Deliberate Elimination Attempts (1990-2013)

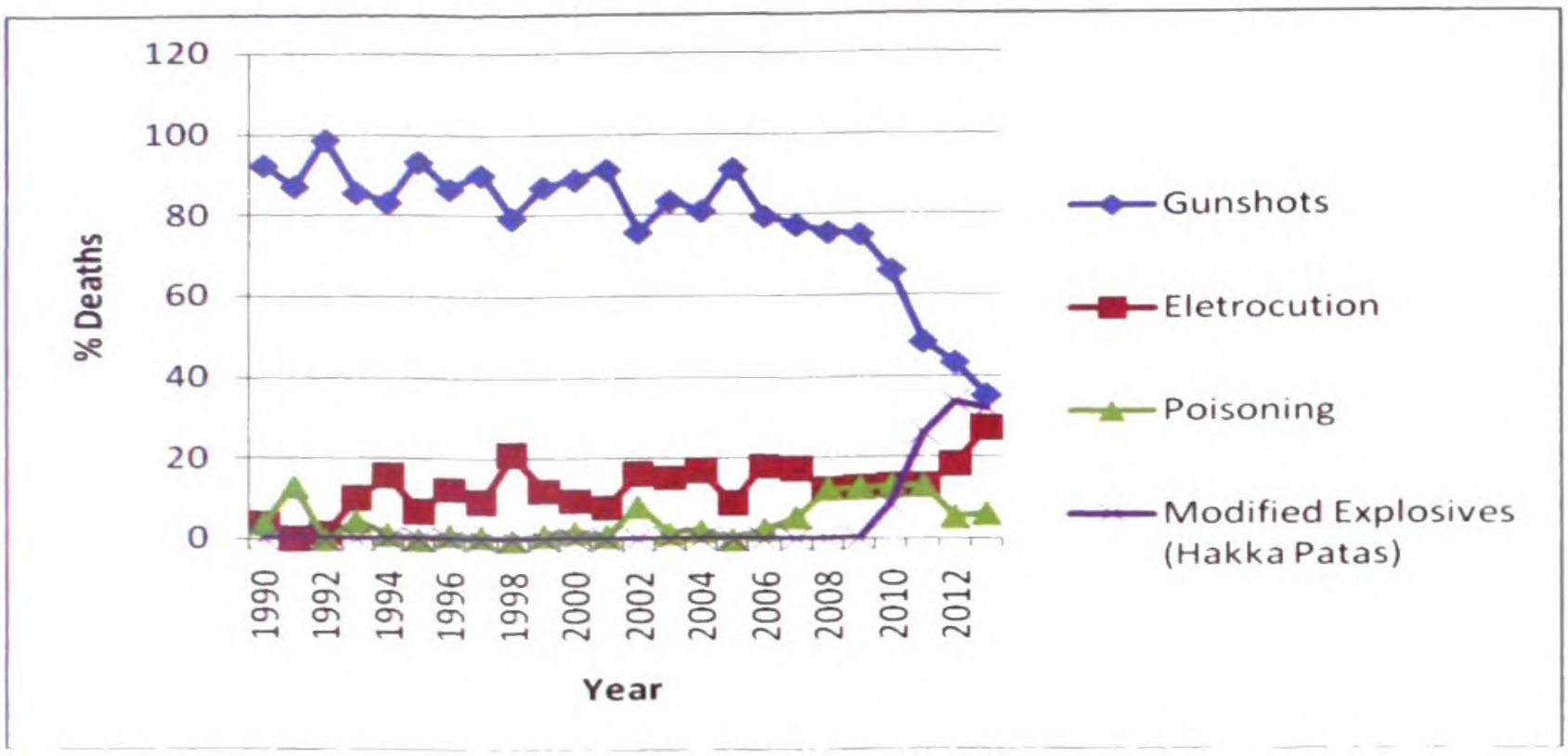

Figure 8. Percentage of Elephant Deaths due to Deliberate Elimination Attempts (1990-2013)

In the recent past DWC, the government authority responsible for the management of HEC, has taken several initiatives to ease the burden of HEC on both humans and elephants. All these initiatives seem to be intensified within a relatively shorter period. One way, it is an indication to the commitment of authorities to resolve HEC. On the other hand it is an indication of the stress created by HEC over the society, heavy demand for resolution of HEC and inescapable responsibility of the authorities in resolving HEC. Table 01 summarizes these initiatives that have been implanted by authorities.

Table 1. Chronological Order of Application of Strategies by the Authorities to Resolve HEC and other Issues in Wildlife Conservation

Year	Initiative	Significance
1990's	Distribution of thunder and serpent flares among HEC trodden communities	This method was introduced in late 1970s but extensive use was initiated in early 1990s.
2004	Awareness programmes for villagers, school children and government Officers	Values of elephant conservation were attributed in the programme contents. Conceptual/visionary gaps of HEC were tried (attempted?) to be narrowed down.
	Community Outreach Programme	Mutual benefits for conservation were intended to be made aware. Direct involvement of the community for HEC mitigation around some project areas was obtained.

2005	Compensation scheme for HEC related damages to human was revised / implemented in lieu of the insurance scheme	Expedited payments and a realistic payment structure were adopted
	Enactment of Increase of Fines Act No.12 of 2005	Fines for the crimes against elephants remarkably increased
2006	National Elephant Conservation Policy	Scope of elephant conservation was widened. Mitigatory strategies for HEC were extensively discussed
2008	Electric Fencing to control home range used by elephants	Electric Fences were introduced in 1992. But extensive use of this methodology was initiated in 2008.
2009	'Gaja Mithuro' Programme	Mitigation of HEC is the prime target. Sri Lanka's first organized programme to resolve HEC
	Amendment of FFPO	Legal provisions to act against the crimes on elephants were strengthened

More interestingly, invention of new methodologies for killing elephants show signs of correlation with the various strategic initiatives launched by authorities, as aforementioned, to mitigate HEC occurrences, to curtail wildlife crimes and to compensate the cost that the communities bear when protected areas are in their neighborhood. Figure 09 shows a matching situation, the chronological order of appearing new strategies of killing elephants and application of various ways and means to mitigate HEC.

Continuous increase of elephant deaths in the early years, evolving new ways to kill elephants, temporal shift of proportionate composition of the methods used by people to kill elephants and its relationship with the various programmes launched by the authorities to mitigate HEC and other wildlife conservation issues clearly indicate that the individuals those who commit crimes by killing elephants show very clear strategic adaptations to continue their engagement in killing elephants. A game behavior at such intensity is not shown between elephants and the individuals of community and between elephants and the authorities. So, rather than supporting HEC mitigation efforts launched by the authorities, individuals continue to kill elephants at a rate comparable to the days before the programmess, although they have shifted their tactics.

However, with the launch of a intensive electric fencing programme through 'Gaja Mithuro' programme, throughout the country, it has created an environment where the separation of the two players, elephants and communities, has gradually intensified. It seems to have resulted in reduced interactions between these two types of players. This can be attributed to the reduced annual numbers of elephant deaths due to deliberate attempts, so that it has

proven that the separation of humans and elephants is the most feasible solution at present. On the other hand, separation of elephants and humans or containing elephants away from the human habitation has been the most awaited solution for the community.

Although the separation of two players apart seems to be a promising solution for HEC, self engaged burden by the DWC should be the securing of basic needs of the habitats for elephants at remaining elephant ranges.

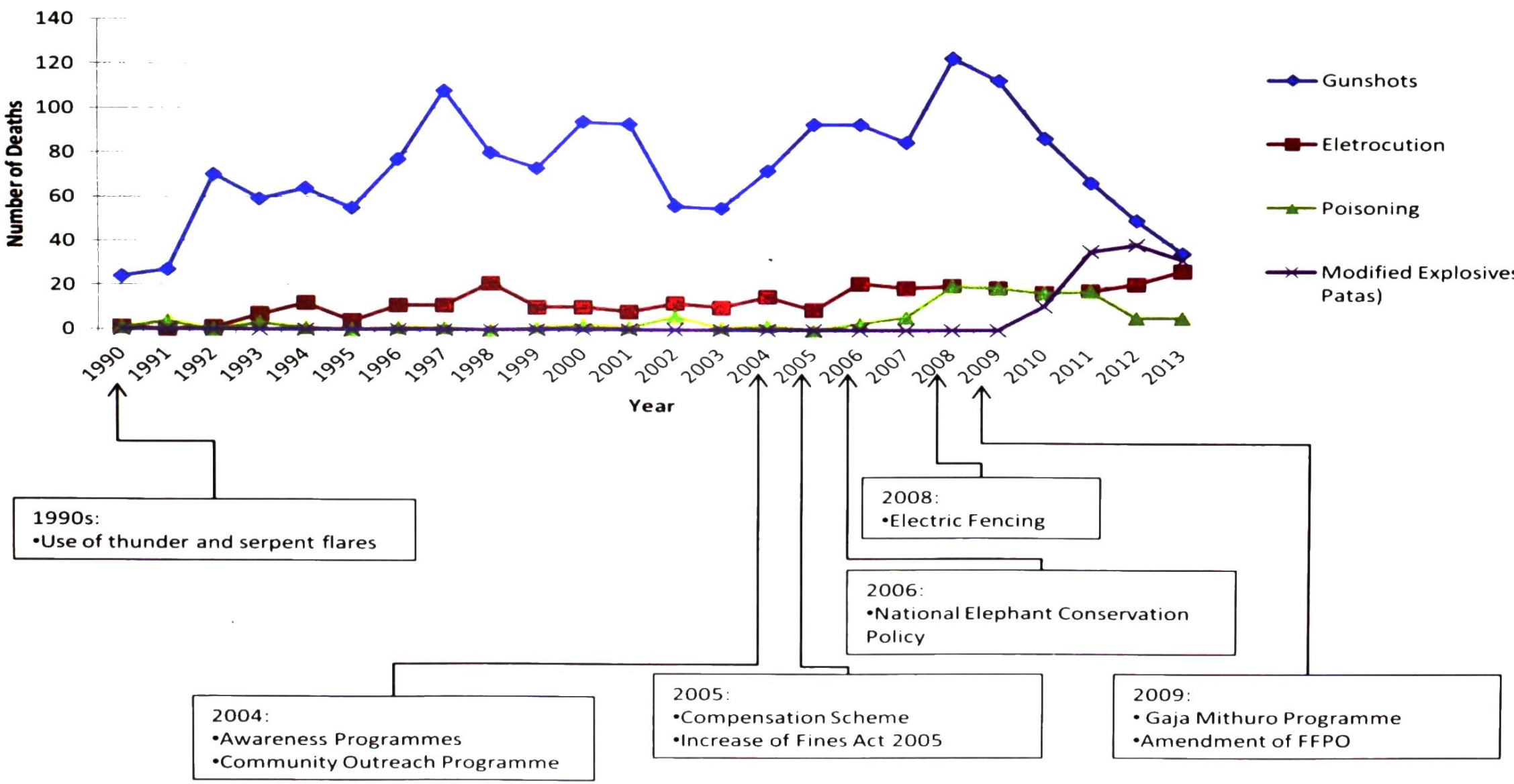

Figure 9. Elephant Deaths vs. Time labeled with major strategic initiatives by authorities to prevent HEC

Compared to the human being, it seems that the elephant is less active in the game with the human being. This can be attributed to the fact that in a matriarchal society there is a lesser chance of transmitting the experience of adult males to younger generations.

Most of the management interventions are 'adult male centered' approaches, at the most, adult males are captured and translocated, elephant holding grounds are for marauding adult males, data and information pooled to determine the electric fence paths are related to adult male movements and the use of thunder and serpent flares are mainly for chasing the crop raiding adult males away.

New Approach Suggested

Therefore, for a long lasting HEC mitigation and for a viable elephant population, entire cross section of the elephant population should be treated. This may be a marked turn from the adherence to the human elephant coexistence approach. The new approach will consists of the following components.

1. Newcomer trouble making adult males must be contained into well managed habitats, so that habitats may be managed with more emphasis than what is at present. In addition use of techniques to confine their movements for pre-defined area is a must.

2. Memory effect in matriarchal line has to be managed in identified troublesome herds or clans so that their contribution to HEC in the way of traditional movement related incidents may be managed.

3. Encounters between human and elephants must strictly be controlled.

4. Improved habitats, both in qualitatively and quantitatively, for elephants must be made available.

This hypothesized scenario is depicted by figure 10.

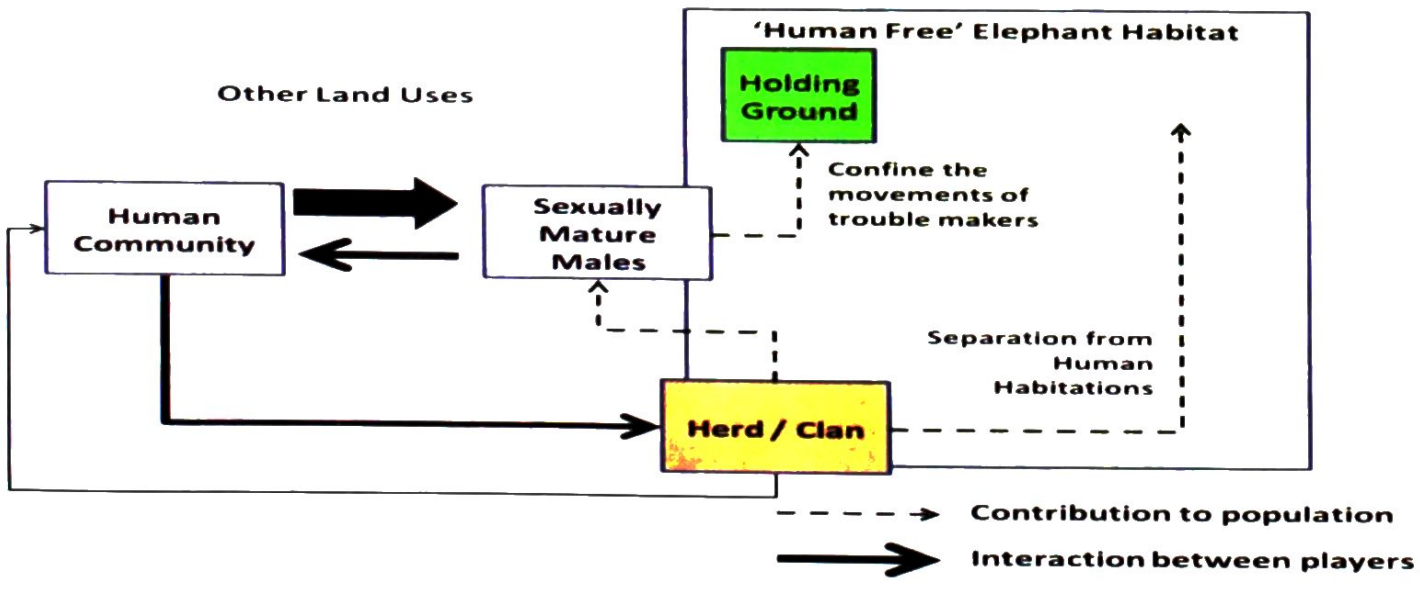

Figure 10. Merging present scenario and proposed approach

CONCLUSIONS

1. Relatively more prominent strategic game behavior seems to exist between authorities and individuals where elephants are victimized.

2. It is vital to take a discernible turn from coexistence model to strict separation of two types of players, authorities and individuals of the communities, from elephants at least in the critical HEC ranges.

3. Management of elephant habitats in view of preventing human elephant encounters becomes the most cumbersome responsibility and the most tedious task for the authorities.

REFERENCES

Anon, (2006). National Policy for Conservation and Management of Elephants, Department of Wildlife Conservation and Ministry of Environment and Natural Resources. *Unpublished.*

DWC, (2012). Performance Report of the Department of Wildlife Conservation-2011. Department of Wildlife Conservation. *Unpublished.*