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FATALITY PERCENTAGES OF SRI LANKAN LEOPARDS (*Panthera pardus kotiya*) KILLED IN HUMAN ACTIVITIES IN SRI LANKA

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The management and rehabilitation of the wild leopard (Panthera pardus kotiya) population could be helped by understanding the causes of fatalities. Past examination of 25 fatality cases between 2010-2016 shows that the main reason was human activities.

In sub-adults, the fatality patterns were similar in male and females causes of death varied in the, mid and low countries. In the coming years this percentage can be brought down through the understanding of habitat and the reasons for fatalities. Apart from to this adoption of methods to protect the habitats as well as the reduction of industrial agriculture in the areas where there are high population of leopards the use of effective management techniques in the form of sign boards, restrictive speed limits would reduce fatality percentages.

Приведены данные по наблюдению за жизнью диких леопардов для уточнения наиболее распространенных причин их гибели. Рассматривались и оценивались случаи гибели леопардов в течение 2010-2016 годов, показывающие, что основной и наиболее частой причиной гибели леопардов явился человеческий фактор. Среди всех половозрастных групп наблюдалась эта же тенденция, то есть человеческий фактор также являлся основной причиной гибели животных. Этот процент гибели может быть снижен за счет понимания особенностей жизни и обитания леопардов. В дополнение к этому необходимо применять меры по защите окружающей среды, особенно в тех местах, где сосредоточена большая популяция этих животных, необходимо контролировать развитие сельского хозяйства в данных областях, привлекать внимание людей к данной проблеме за счет информации в виде вывесок, ограничивать скорость движения транспорта, чтобы снизить процент гибели животных.

Keywords: leopard, fatality, reasons, female, male, human activities, habitat, agroculture.
Ключевые слова: леопард, смертность, причины, самка, самец, деятельность людей, среда обитания, агрокультура.

Introduction. The Sri Lankan leopard (*Panthera pardus kotiya*) has been classified as endangered by the IUCN (International Union for Conservation of Nature) and is a leopard subspecies that is native to Sri Lanka. The population of leopards which is not larger than a mere 250 animals is declining due to a number of reasons which includes poaching and also the human-leopard conflict.

The Sri Lanka leopard ("Panthera pardus kotiya"), colloquially known as Kotiya, is a subspecies of leopard native to Sri Lanka. However, "kotiyā" is now the colloquial Sinhala name for the tiger and "diviyā" is used for the leopard. See below for more information. A recent study has shown that Yala National Park has one of the highest recorded densities of leopards in the world, although this animal is still considered to be endangered. The Wilpattu National Park in Sri Lanka is also known as a good place to watch leopards. Leopards tend to be more readily observed in parts of Sri Lanka than in other countries where they share their habitat with more dominant competitors, such as lions orhyaenas.

Distribution and Eating Patterns of the Sri Lankan leopard. Historically, the Sri Lankan leopard was found in all habitats throughout the country which consists of the wet zone, dry zone and arid zone. leopards have been mainly observed in dry ever green monsoon forests, arid scrub jungle, rainforests, low and upper highland forests as well as wet zone intermediate forests. Now the population has been limited to certain areas of the country which value the conservation of these creatures. Some of the most well known locations to watch leopards in their natural habitat would be the Yala National Park and the Wilpattu National Park. Leopards are considered as nocturnal animals but they are also encountered during day time. This is mainly during early mornings and late afternoons. These creatures usually hunt alone except during the mating season or when mother and cubs are encountered in the wild.

The Sri Lankan leopard too is a carnivorous animal while they feed on a variety of species from hare, Sambar deer, langurs and even rats. Eating patterns may also include frogs, birds, reptiles, other types of rodents and even insects.

Physical Characteristics. Main characteristics of the leopard include the rusty yellow coat with dark spots. The average weight of a male is 170 lb and a female is close to 64 lb. The tail of the leo-

pard is longer than half of its body length when measured from head to tail. The shoulder height is about 45 to 80 cm. Their ability to climb trees comes with the strong muscles that are attached to the scapula. The males are at least 30% larger than females while mature males are supposed to have broad and larger heads. This Sri Lankan subspecies of leopard can be named as the largest subspecies of leopard in the world.

Conservation of the Sri Lankan leopard. Habitat losses, hunting for trade and fragmentation have become reasons for the Sri Lankan leopard to rapidly decline. Research is carried out on a regular basis to strengthen conservation measures of the Sri Lankan leopard. WWCT (Wilderness and Wildlife Conservation Trust) together with the Government of Sri Lanka have been working on "The leopard Project" to make sure that conservation is carried out to the island's full potential. The Sri Lanka Wildlife Conservation Society has also put its resources to study and research these endangered species.

The leopard is the prominent predator of Sri Lanka [1, 3]. Leopards prey on the wide variety of animals contributing to ecological balance. They are distributed over a broad geographical range extending from the low country to the up country [2, 3]. It is classified as endangered but its conservation status remains unresolved (http://www.cea.lk/web/images/pdf/redlist2012.pdf). Over the years a spate of leopard killings has been reported mainly in the hill country of Sri Lanka. It is not a real conflict between human beings and leopards, but that people deliberately kill leopards for the flesh and the skin. Currently natural forest cover is becoming limited in Sri Lanka. Natural forest cover in Sri Lanka is getting limited with human settlements, estates and small farms accounting for most of the area. Hence, as leopards wander into human areas they become easy targets (Mass Media).

Deforestation is a threat to the leopards, but also makes the land vulnerable to landslides and creates a shortage of water as well. Forest patches between estates have been cut by the villagers for firewood, thereby depriving the leopards of their habitat, it is the fault of the people that has led to a series of issues. Another reason for the decrease of leopards in the area and the occurrence of human leopard conflict is forest fires. Forest fires often result due to attempts by residents to clear jungle areas for cultivation and push the leopards into human settlements.

The reduction of habitats is a significant contributor to the escalation of the human-leopard conflict in many places around the world [7, 9]. Due to the growing demand for food, leopards lose their hunting grounds to farm lands. As a consequence, they hunt for easy prey such as livestock which in turn affecting the farmers. The change of preying habits causes leopards many threats when they deliberately getting into farmlands and settlements [10]. Today, number of countries with high leopard fatality rates are bringing the percentages down [6]. But in Sri Lanka no effective methods have been adopted with regard to this aspect (Personal Communication).The species had been frequently removed or dispatched from their habitats with little knowledge of their distribution or genetic status and area of disbursed [4, 5]. Therefore it is to be studied the factors for growing conflicts and the consequence of their habitat loses [6].

Materials and methods of the research. A database on leopard fatalities in Sri Lanka has been maintained during the period from 2010-2016. The data were collected from mass media broadcasts and through personal communication. Twenty five cases of fatalities were collected and the data were recorded on the sex, cause of death and the developmental stage of each leopard.

Results of the research. The lowest fatality percentage was recorded from the up country (12%) and the highest in the low country (56%) (figure 1). These records disclose that the rate of fatalities in male (60%) is approximately double that of the females (36%) (figure 2). Out of the deaths, 40% had been in adult males; where no deaths in male cubs have been recorded. With respect to female leopards, majority belonged to the sub adult category (20%) followed by mature females (12%) and cubs (4%) (figure 3).

The lowest percentage of deaths was recorded in the year 2010 (4%), however there was a remarkable increase in 2011 (possible reasons). Although there was a decline in 2012-2013 period, the deaths again escalated up to 24% in the year 2014 (figure 4).

Most of these deaths had been due to human activities (56%) such as snares, accidents and gunshots,. Around 1/3 had been due to unknown causes whereas natural causes such as "inter/intra species fighting (natural fatalities)" account for 12% (figure 5). Close analysis of the deaths caused due to human activities revealed that most damage had been due to snares (50%). Gun shots are responsible for 21% of the deaths where as the deliberate use of explosives have caused 7% of the leopard lives. Another 14% have died due to poisoning. Deaths due to traffic accidents have also been recorded especially in the low country (12%) (figure 6).

Conclusion. Minimizing the human-leopard conflict is an important consideration in the present time due to escalating deaths of leopards in Sri Lanka which is classified as an endangered animals [13].

The most common causes of fatality have been due to deliberate human activities (figure 6). Effective management strategies such as, putting up of sign boards, Impressing the speed limits to transport vehicles in areas where there are evidence of leopard movements, restriction of human ac-

tivities in the native habitats of the leopards. Minimizing of poaching can be done through antipoaching techniques in the form of mobile biological sensors, GPS systems to detect leopard movements, Unmanned aerial vehicles, and central computer system [11, 12, 13].

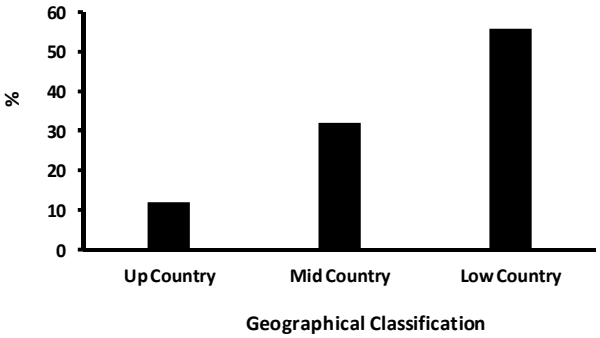

Figure 1 - Fatality percentages of leopards in the three geographical zones of Sri Lanka (2010-2015)

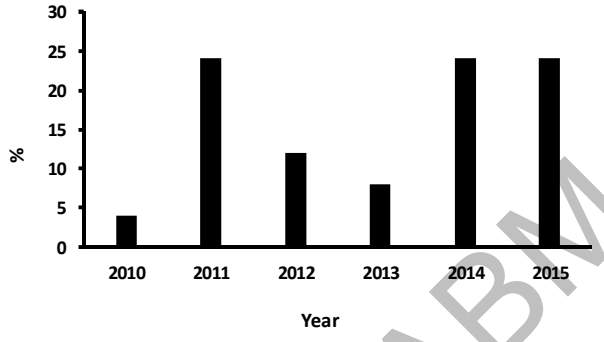

Figure 4 - Total fatality percentages of Sri Lankan leopards from year 2010-2015

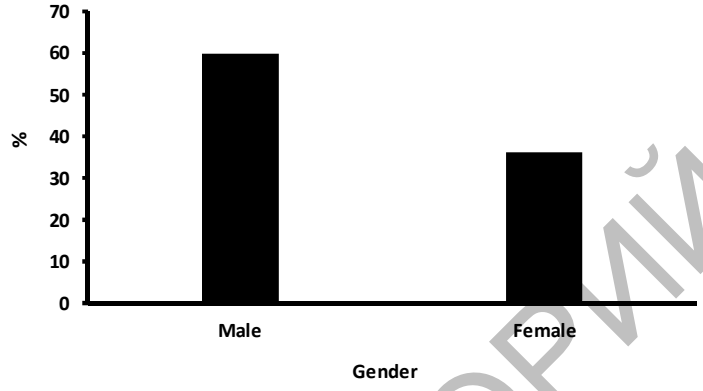

Figure 02 - Fatality percentages of males and female Sri Lankan leopards during the period (2010-2015)

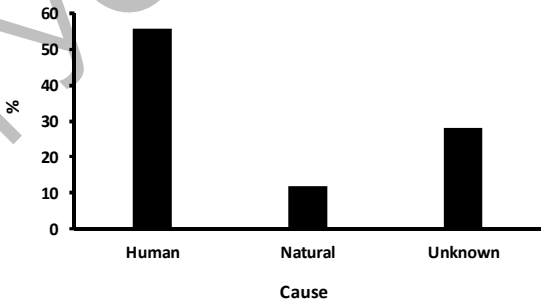

Figure 5 - Causes of fatality in Sri Lankan leopards from 2010-2015

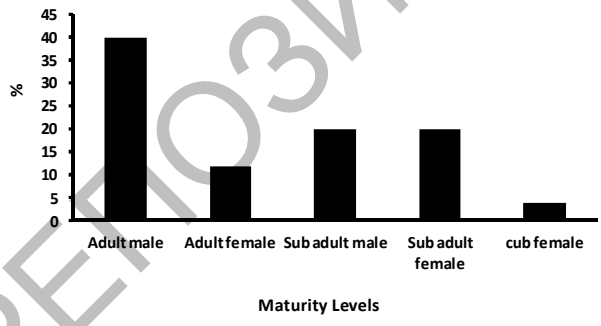

Figure 3 - Sri Lankan leopard deaths according to the stage of maturity

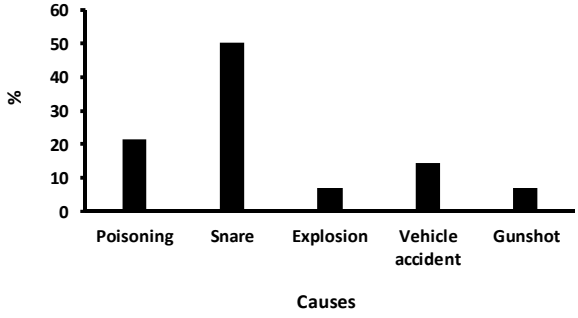

Figure 6 - Human activities causing fatalities of Sri Lankan leopards (2010-2015)

Conclusion. This study showed that the main causes of leopards mortality – human activity. In sub-adults, the fatality patterns were similar in male and females causes of death varied from the up, mid and low countries. In the coming years this percentage can be brought down through the understanding of habitat and the reasons for fatalities. Further to this adoption of methods to protect the habitats as well as the reduction of industrial agriculture in the areas where there are high population

of leopards is using of effective management techniques in the form of sign boards, restrictive speed limits which would reduce fatality percentage.

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