

## An Analysis of Lightning-Related Damages and Deaths

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### Project Summary

**Background:** Every year in Sri Lanka, lightning kills dozens of people and causes property damage estimated at a few hundred million rupees. Unlike losses from other natural disasters, lightning-related losses can be minimized by improving public awareness and adopting better standards and effective protection mechanisms. The aim of this study was to collect data on lightning-related losses over the entire country in 2014 to help stakeholders review and improve their risk reduction and risk management procedures.

**Methods:** The study collected data on lightning-related losses of both property and life during the second inter-monsoon period in October and November 2014.

**Findings.** According to the Disaster Management Center, from 2012 through November 2014, lightning caused 106 deaths and injured 51 people in Sri Lanka. In 2014 alone, there were 20 deaths and eight injuries from lightning strikes. The incidents peaked during the two inter-monsoon periods. This study was only able to investigate incidents during the second inter-monsoon period in October and November, during which the intensity of lightning and therefore damages were relatively low. Four deaths were reported from a single lightning strike to structure under which people were sheltering from the rain. All four deaths could have been avoided if the shelter had been properly grounded.

**Conclusions:** Such losses could be avoided by increasing awareness among the public of the need to ground unprotected structures. This study should be continued to the next inter-monsoon period expected in March–April 2015 for a complete analysis.

## 1 Introduction

Every year lightning causes tremendous loss to property and life. Lightning-related losses are not limited to direct damage to structures, power and telecommunication networks, and electrical, electronic and communication equipment. Indirect economic losses from down time of power and communication networks, loss of electronically stored data, and lightning-related fires can be many times more serious than the direct damage.

In Sri Lanka, the estimated death toll due from lightning from 2012 through November 2014 was over 100 (table 1).

**Table 1. Lightning deaths and injuries in Sri Lanka (2012–2014)**

Year	Deaths	Injuries
2012	68	36
2013	18	7
2014 (up to November)	20	8

*Source:* Disaster Management Centre, 2014

It is estimated that every second, over 1,000 lightning strikes take place in the world. The global annual mortality rate could be well over a thousand. Given the frequency of the event, lightning can be considered the greatest natural disaster resulting in loss of life and large economic losses.

Because of its location, Sri Lanka is affected by two major lightning seasons during the inter-monsoon periods in the months of March–April and October–November. Lightning-related deaths and damages peak during these seasons. Because there has been no comprehensive survey or investigation of lightning-related losses, it is difficult to quantify the financial losses, most affected sectors, and more important, the loss of human life. Detailed case studies are important in the case of human losses to determine the mode of interaction, type of injuries, and survival rate. Lack of such data is a major constraint to taking effective risk reduction measures and thereby increasing resilience to this natural hazard.

## 2 Project Outputs and Outcomes

A poster of the findings was presented at the Disaster Management Exhibition on National Safety Day on 26 December, 2014.

## 3 How Did You Go about Achieving Your Outputs/Outcomes?

Lightning is a seasonal event, and this research was planned to cover both lightning seasons. Unfortunately, the study could only cover the second inter-monsoon period in October and November 2014. During this period, only one incident was recorded. This was investigated by visiting the location, making observations, interviewing eyewitnesses, and gathering data. The study will be more useful if it can be extended to cover the inter-monsoon in March–April 2015 to be able to investigate more incidents.

## 4 What Did You Learn?

This study began in May 2014. There was a heavy lightning period in March–April 2014, with over 10 reported deaths. Lightning activity decreased in May with the end of the inter-monsoon period. The project therefore concentrated on the second inter-monsoon period in

October–November. Historical data show fewer fatalities during this period. Four deaths were reported from a single lightning strike on an unprotected shelter where people were sheltering from the rain (figure 1).



**Figure 1: Unprotected shelter where four people were struck by lightning (photo: Dr. J. A. P. Bodhika)**

The lightning first struck a nearby tree (figure 2) and then created a side-flash to the shelter (figure 3).





**Figure 2. Tree struck by lightning (photo: Dr. J. A. P. Bodhika)**



**Figure 3. Path to ground through an umbrella hung on the shelter.**

**The lightning strike continued to ground through one victim (photo: Dr. J. A. P. Bodhika)**

Because of poor grounding (figure 4), the lightning current then flowed to ground through one victim, and the created step potential was responsible for the death of the other three. All four deaths would have been avoided if the shelter had been grounded properly.



**Poor grounding was responsible for the step potential, taking three more victims (photo: Dr. J. A. P. Bodhika)**

The researchers were not able to cover the first inter-monsoon period from March to April, which is usually a more intense lightning period with higher reported deaths and property losses. A desk review was carried out to provide information about losses during this period.

## 5 Immediate Impact

There has been no comprehensive study of deaths from lightning in Sri Lanka. This study filled the gap and increased knowledge of how lightning interacts with humans to result in death and injury. Most deaths from lightning occur outside in open areas or under trees. The study highlights the vulnerability of people in unprotected shelters. There are a large



number of such structures around the country, including low-cost housing in shanty areas and plantations.

## 6 Future Impact

This incident should raise the awareness of disaster risk assessors and disaster management practitioners to persuade stakeholders to provide basic protection (grounding) for unprotected structures. A report is planned to propose low-cost remedies.

## 7 Conclusions

The one incident investigated during the study period was the result of seeking shelter from the rain in a poorly protected structure. Such losses could be avoided by increasing awareness among the public of the need to ground unprotected structures. This study should be continued to the next inter-monsoon in March–April 2015 for a complete analysis. This will allow visits to sites of lightning strikes to assess or record damages and find out the modes of interaction and types of injuries of lightning victims.

## 8 Implications for the future

Increasing public awareness of how to avoid injury and damage from lightning is essential. Even people who are well aware of the dangers may avoid taking precautions because of a false sense of safety. Mass media can be used during the lightning seasons to remind people of the dangers of lightning and educate them on how to prevent injury and death.

## 9 Budget Narrative

Payments and purchases are not yet finalized. A complete statement of accounts will be provided in January 2015. The activities were within the budget, and because the cost of the field work was low (only one inter-monsoon period was covered), there is some money unspent for field work. The balance will be returned upon finalizing the payments.

## 9 Publications

A paper based on this report will be presented at an appropriate scientific conference or submitted to a journal once the authors have investigated at least two more incidents.

## References

Disaster Management Centre. Colombo, Sri Lanka. <http://www.dmc.gov.lk/>.

Disaster Information Management System in Sri Lanka.  
<http://www.desinventar.lk/DesInventar/main.jsp?countrycode=sr&continue=y>.