3 Disaster Event & Impact Profile

3.1 Introduction

This chapter describes the major disasters based on their patterns of distribution (chronological, spatial and seasonal) and the related impacts. The chapter also gives a brief overview of the disaster event profile of Sri Lanka and how each impact variable has been distributed chronologically, seasonally and spatially.

The disaster event profile of Sri Lanka is based on the Sri Lanka Historical Disaster Information System, designed by the Disaster Management Centre (DMC), Ministry of Disaster Management, in line with DesInventar system developed by the LA RED in Latin America. The DesInventar methodology has used historical data to measure the impact of disasters, collected in a systematic and homogeneous manner in the process of identifying disasters and vulnerabilities and thus disaster risks on specific geographical units of Sri Lanka, i.e. Districts and Divisional Secretariat Divisions (DSDs).

The disaster event profile of Sri Lanka presents how disaster events of different categories have been distributed chronologically, seasonally and spatially. Distribution wise, the overall disaster typology in Sri Lanka is not distributed evenly. In terms of annual time series distribution, animal attacks seem to have increased. However, disasters like floods seem to take place every year.

The seasonal distribution of disasters shows two peaks; one from April to June and the other from October to December, representing the two monsoon seasons. Spatial distribution of disaster records is uneven, ranging from 96 to 1887 (upper limit) at district level and from 9 to 74 (upper limit) at DS level. It can be observed that while taking the number of people affected by disasters into consideration, the share of climate related disasters is 96%, showing the dominating importance of these disasters over the others.

Extreme wind events have caused the most number of deaths (926). Most of the damage and destruction to houses has been due to floods (232,236) and wind events (201,793). Droughts have been mostly responsible for agricultural loss, followed by floods and wind events. Geological disasters like earthquakes, tsunami, volcanoes and landslides can cause massive destruction to lives and property. In Sri Lanka, landslide is the most common geological hazard. Earthquakes of low to moderate magnitude have been recorded over the past 400 years in Sri Lanka with very limited damage. Therefore, no accurate data is available.

The disaster event and impact profiles outline different types of disaster events with the intensity of their effects and spatial distribution, showing types of events and to what degree they are relevant compared to other events.

The relevance is based on the number of events and different effect variables, such as (a) Number of people affected, (b) Loss of life, (c) Number of destroyed or damaged houses/buildings, and (d) Loss of agricultural crops. Selected disaster categories are taken into consideration for the analysis and the data of the selected attributes of disaster categories is assessed from different

perspectives to portray the disaster situation of Sri Lanka for the period of 1974-2008.

In the maps in this chapter illustrating the spatial distribution of the following variables at district and division levels, "0/No data" in the scale representing the respective district/division, means either there is no data or there have been no events / impacts pertaining to that district/division:

- Disaster events
- People affected
- Loss of life due to disasters.
- Houses destroyed and damaged by disasters.
- Losses to agricultural crops due to disasters.
- Different Disaster Categories.
- Impacts due to Different Disaster Categories.

Also in these maps, the DS division maps may appear to be inconsistent when compared with the district level maps. This is due to the non-availability of data at the DS division level. Up to the year 2005 the disaster related data are available only at district level and the data gathered since then are available at DS division level also. In spite of this shortcoming DS Division maps have been presented along with the District level maps in the relevant sections, so that wherever data is available these will be useful for the reader.

3.2 Disaster Profiles

3.2.1 DesInventar Disaster Profile

Figures 16 and 17 below show that there are many types of events in the country but the most common are animal attacks (7,203 events), fire (2,704 events- urban and forest fire), flood (1,397 events- riverine flood, urban flood, flash flood, rain), extreme wind events (1,263 events- Cyclone, Strong Wind, Surge, Gale), drought (285 events), landslides (1,156 events) and lightning (295 events). This figure illustrates that during the period 1974-2008, animal attacks had been the most common disaster, representing 50% of the total, followed by fire, flood, and extreme wind events representing 19%, 10% and 9%, respectively. These four disaster types cover 88% of total number of events during the period under review. The seven disaster events mentioned above are analyzed in the descending order of the number of events during the period under consideration in this chapter. The 2004 Tsunami is considered a singular event and thus has not been considered for this analysis of disaster profile.

Figure 16 : Profile of Different Disaster Categories: 1974-2008

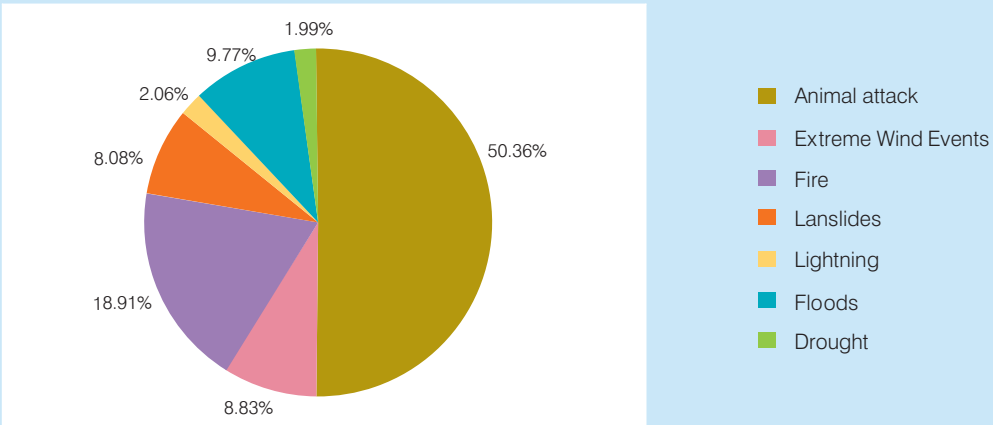

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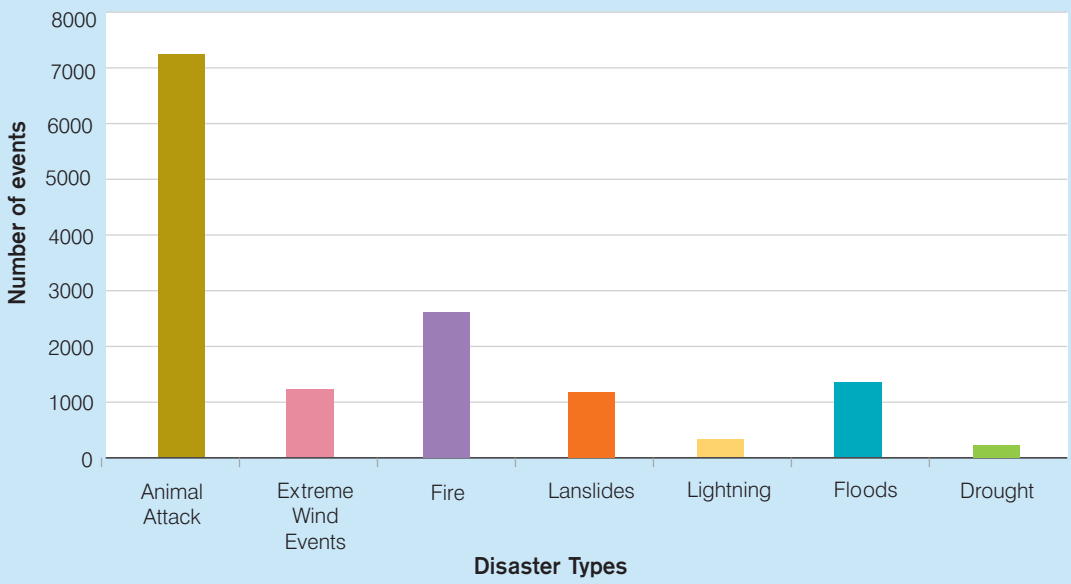
Figure 17 : Profile of Different Disaster Categories: 1974-2008



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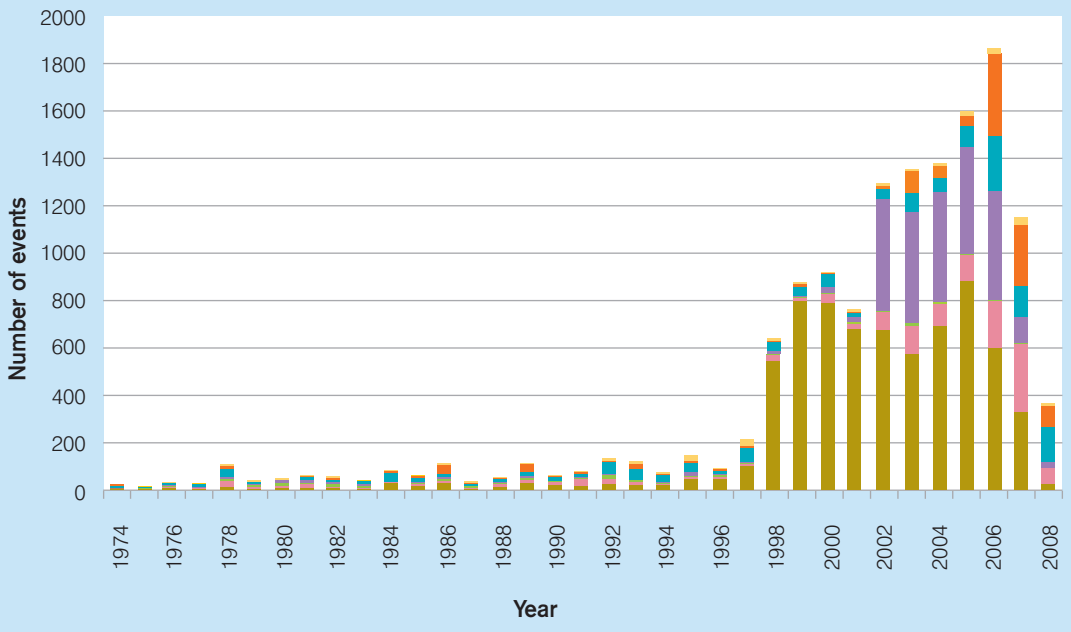
3.2.2 Annual Time Series Distribution

Figure 18 shows the chronological distribution of disaster types over the period January 1974 to December 2008. It illustrates the dominance of animal attacks over a certain period of time. The sudden increase in animal attacks after 1998 is mainly due to the commencement of systematic recording of events, rather than a sudden outbreak of animal attacks. There are two main trends shown in the figure. First, from 1974 to 1997, there is gradual increase in the number of disaster events fluctuating from 0 to 200 events with several peaks. Secondly, disaster events during the period 1997- 2006 show a clear trend of very rapid increase of number of disaster events from about 200 records in 1997 to more than 1,800 records in 2006, with the only break in the trend observed in 2001. There is a sharp break in this trend beginning 2007, but it is too early to predict whether this is a start of a declining trend or not.

Figure 18 : Chronological Trend of Disaster Events



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3.2.3 Seasonal Distribution

The seasonal distribution of disaster types during the period from January 1974 to December 2008 is shown in Figure 19. It shows the cyclical distribution of events with two peaks; one from April to June and the other from October to December, demonstrating a close link with the two monsoon seasons in Sri Lanka, i.e. south-west and second inter-monsoons. May is the peak of south-west monsoon, and October – November is the peak of second inter monsoon. These are the peak months for the occurrence of disaster events, with the highest affected months exceeding 1,400 events. On the other hand, February (end of northeast monsoon) and August (middle of southwest monsoon), two months are the months with the lowest number of recorded disaster events, which ranged from 800-1,000 events.

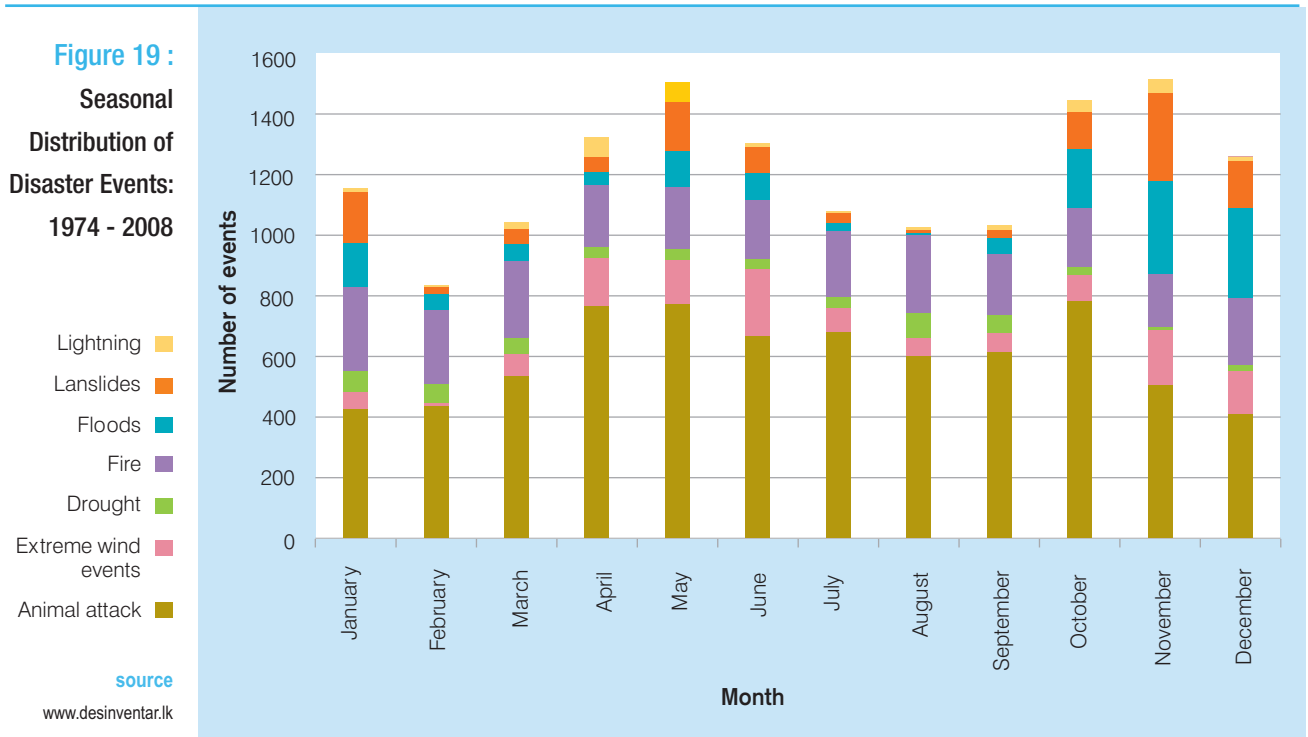
Seasonal distribution of disaster typology shows that all disaster types appear to occur throughout the year, with seasonal changes in scale. Occurrences of floods and landslides are higher in May, October, November & December, while drought is more prevalent in August and March on Southwest monsoon and beginning of first inter monsoonal period. The number of animal attacks is less during the period December, January and February based on seasonal Distribution.

3.2.4 Spatial Distribution

Map 9 illustrates the geographical distribution of disasters across Districts and Divisional Secretariat Divisions in the country. The spatial distribution of disaster events is uneven, ranging from more than 1,887 to less than 96 at district level and from more than 74 to less than 9 at DS level, as can be observed in this map.

The highest number of events has occurred within the district cluster of Anuradhapura, Polonnaruwa, Matale and Kurunegala. The least disaster-prone districts with the minimum number of events occurring are Mullaitivu, Vavuniya, Mannar and Kilinochchi because of data availability. The DS divisions with the largest number of occurrences of disaster events are found within the above mentioned districts. However, a few DS divisions in the southern part of the island like Tissamaharama also appear to have a large number of occurrences of disaster events.

Figure 19 : Seasonal Distribution of Disaster Events: 1974 - 2008



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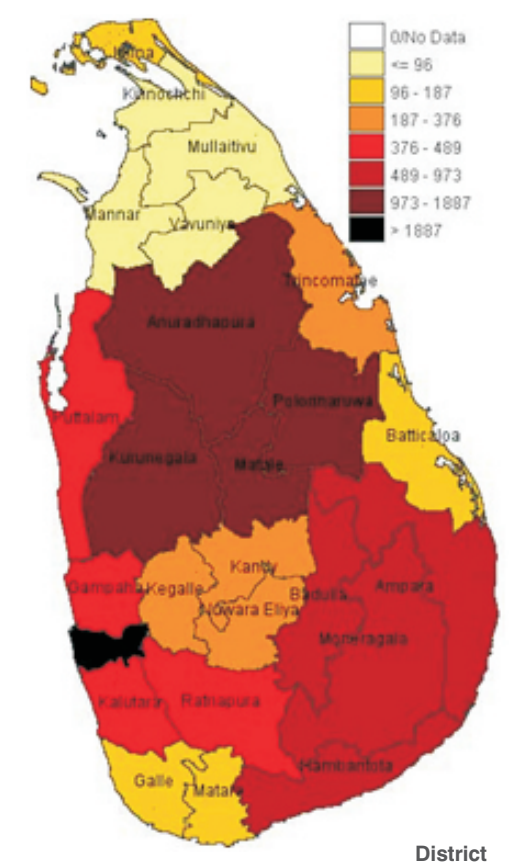
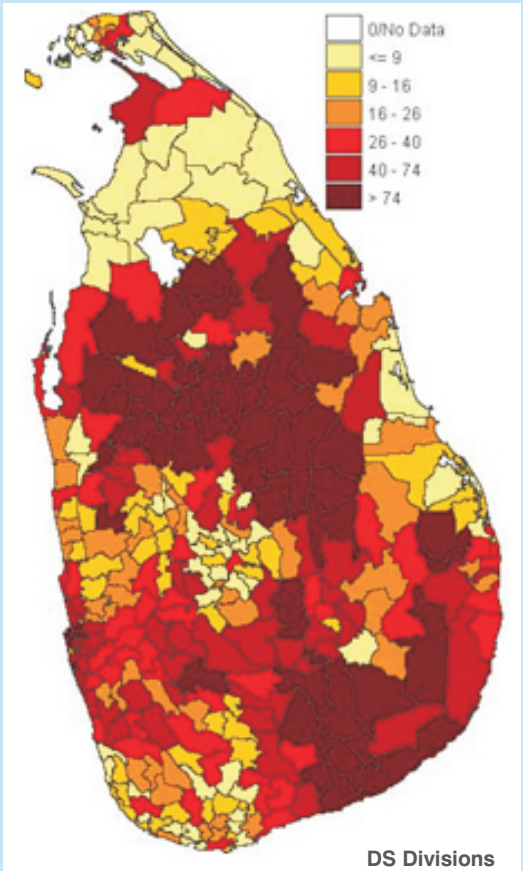
Map 9 : Spatial Distribution of Events by Districts and DS Divisions : 1974-2008



District



DS Divisions

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Box 2 : Conclusions on Disaster Categories and Events

The different disaster categories in Sri Lanka do not seem to be distributed evenly. Sri Lanka seems to be most affected by animal attacks (50%). Although the other disasters do not account for such a high proportion to Sri Lanka's disaster event profile, they make up similar proportions with respect to each other. In terms of time series distribution, animal attacks seem to have increased within the years of 1999-2007, which is attributable to the recent availability of data about wild elephant attacks from the Department of Wildlife Conservation.

However, disasters such as floods seem to take place every year. A look at seasonal distributions shows that all disasters appear to occur evenly throughout the year with May being the most affected by disasters. Further, Anuradhapura, Polonnaruwa and Kurunegala are the hotspot districts for disaster risk, whereas, districts such as Mullaitivu, Vavuniya and Mannar and Kilinochchi take on a cooler stance.

It must be noted here that in spite of the insignificant place occupied by drought in the Profile of Different Disaster Categories compared with the very high places taken up by some other disasters, it should not be underestimated. Drought hazard when occurs, affect a very large geographical area causing severe damage to crops and affecting the population (and livestock) adversely, though there is no life loss. These result in extremely high cost to the government as compensation and relief payment to the affected people.

3.3 Profiles of People Affected by Disasters

3.3.1 Profile of People Affected

Records show that in the past 34 years, 28 million people were affected by natural disasters. Figure 20-B (without Tsunami) shows the number of people affected by disasters. As illustrated in the figure, 92% of the people affected by disaster are either affected by floods (48%) or droughts (44%) without taking into consideration the Tsunami. Extreme wind events are also responsible for affecting 6.5% of the disaster affected people. The share of climatologically disasters is 96%. This shows the dominating importance of climate related disasters as other types of disasters hold a very negligible proportion with respect to the number of people affected. Sri Lanka is an agricultural country mainly dependent on natural resources and lives of the majority of people are directly linked with the environment, the most dynamic element of which is the climate. Therefore any small variation of climate affects people. Figure 20-A shows the statistics taking the Tsunami into consideration and Figure 20-B, without Tsunami.

Figure 20-A : Profile of People Affected due to Different Disaster Categories with Tsunami : 1974 - 2008

source
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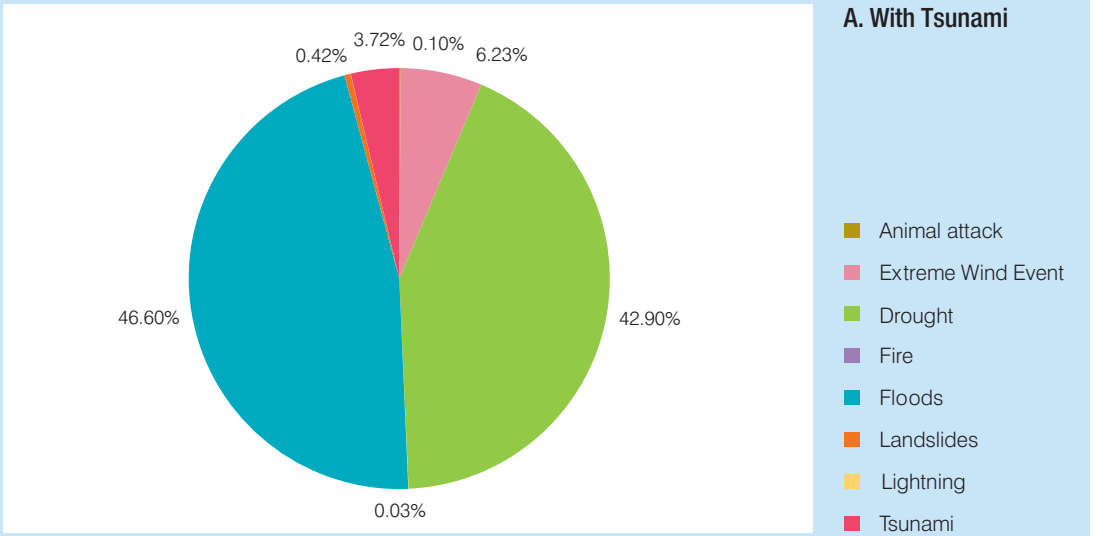

Figure 20-B : Profile of People Affected due to Different Disaster Categories without Tsunami : 1974 - 2008

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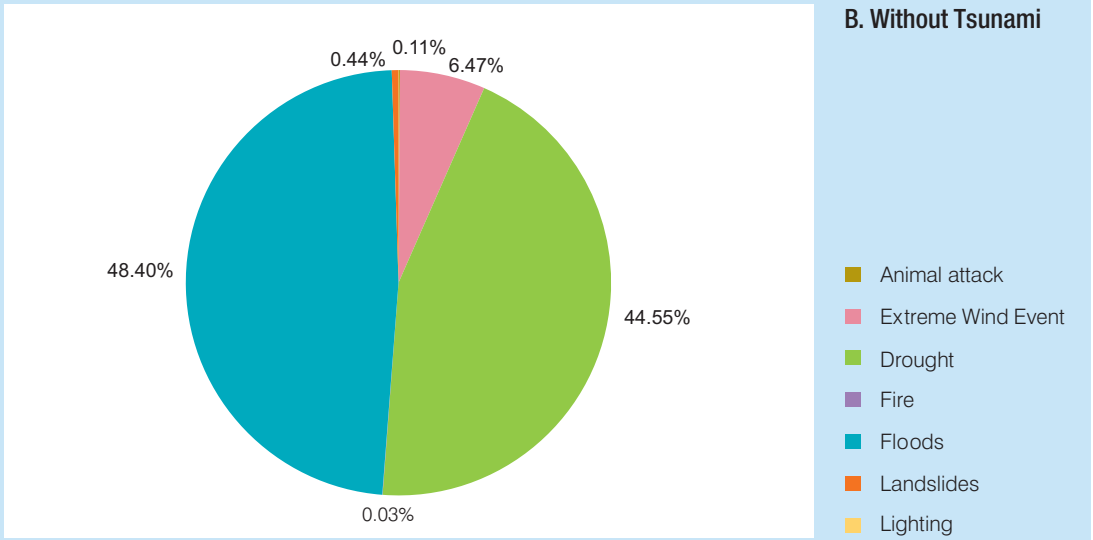

3.3.2 Annual Time Series Distribution of People Affected

The time series distribution with respect to people affected by disaster is fluctuating from 0 to 4 million affected people as per the records. Figure 21 below shows that droughts and floods are the major common causes affecting people in almost all years.

Another dominant type of disaster is the extreme wind event, but it is not as frequent as floods and droughts. A sudden increase in people affected by extreme wind effects can be seen in 1978, 1992 and 2000 only. During the period from 1974 to 2008, the number of affected people due to disaster shows high fluctuation with an increasing trend in general even without taking the Tsunami into consideration.

Figure 21-A : People Affected Due to Disasters - Annual Time Series Distribution

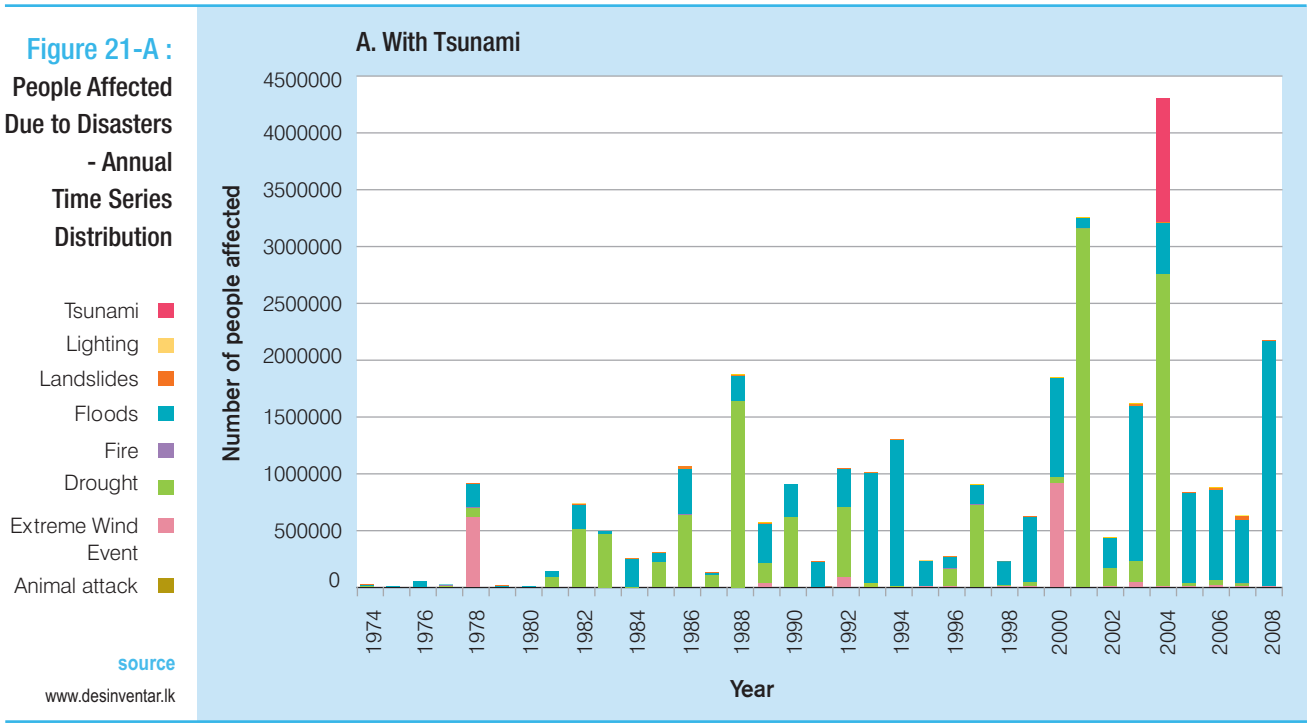

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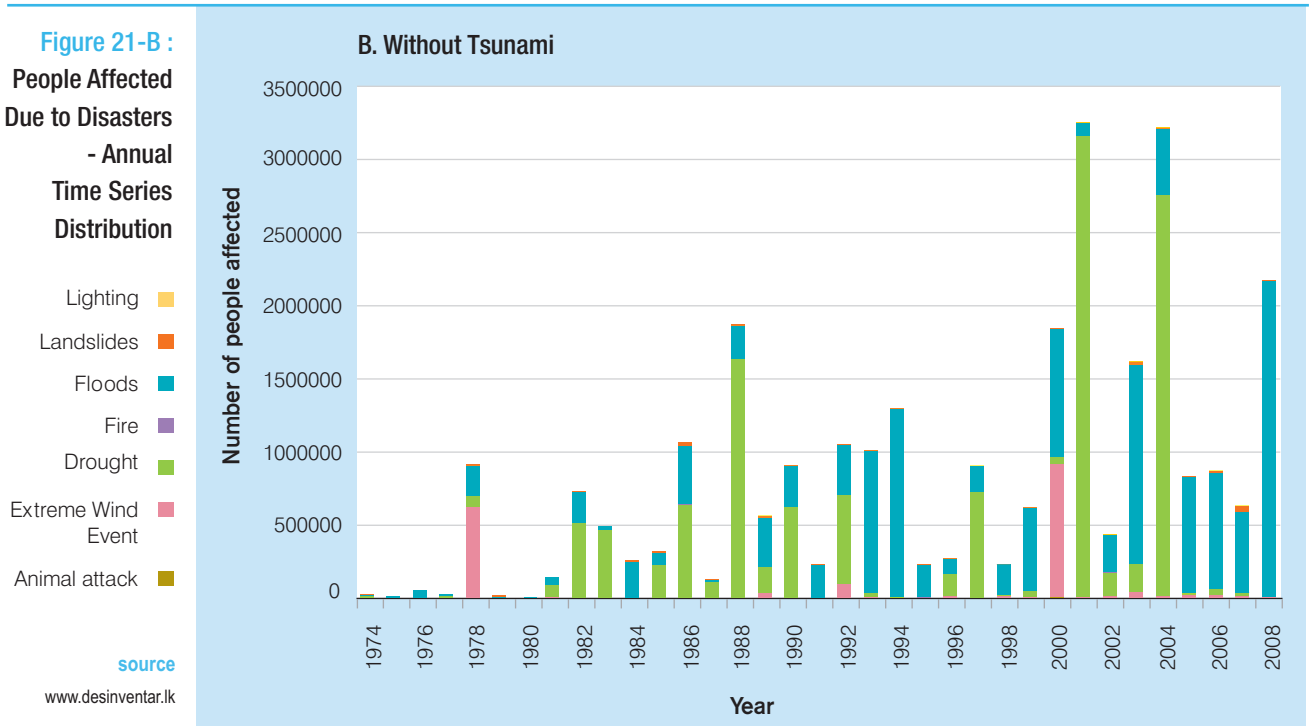
Figure 21-B : People Affected Due to Disasters - Annual Time Series Distribution



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3.3.3 Seasonal Distribution of People Affected

Figure 22-A shows the seasonal distribution of people affected by disasters taking Tsunami into consideration and Figure 22-B, without Tsunami. It shows a cyclical distribution with three peaks in May, August and November/ December/ January (even without taking the Tsunami into consideration). These peaks may have a direct correlation with the monsoon. The two peaks due to floods have a clear correlation with the monsoon rain and the August peak caused by drought show a relationship with the end of southwest monsoon period. The other months appear to take on a lower value.

Figure 22-A : People Affected Due to Disasters – Seasonal Distribution : 1974 to 2008

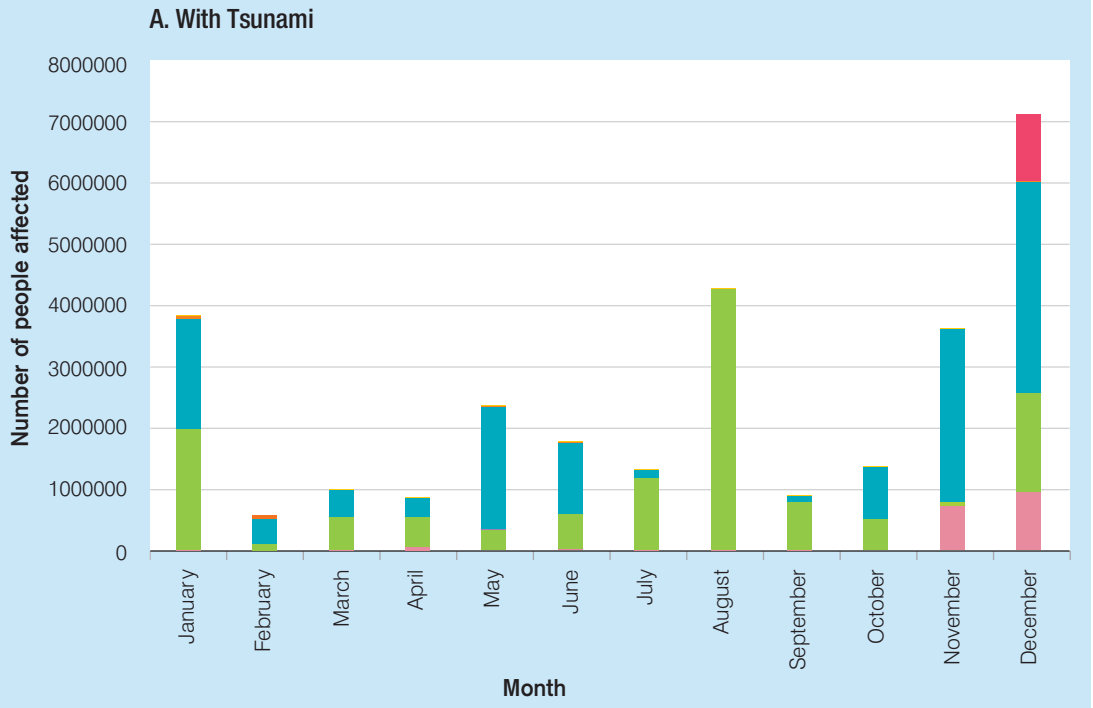

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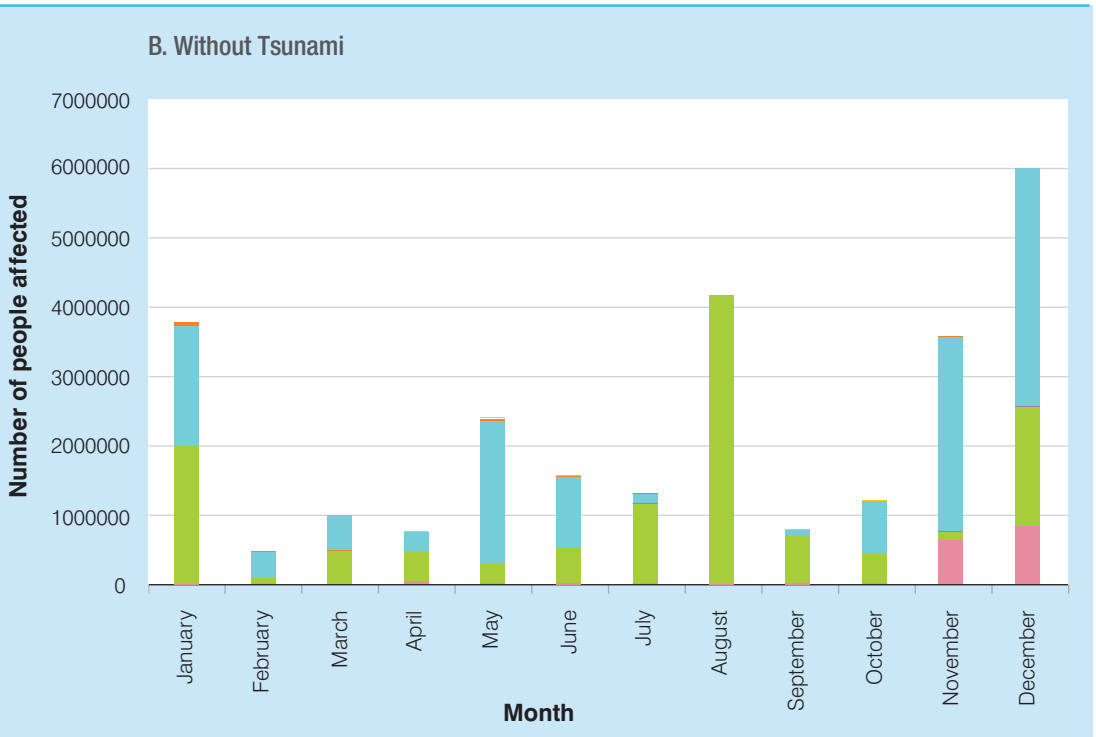
Figure 22-B : People Affected Due to Disasters – Seasonal Distribution : 1974 to 2008



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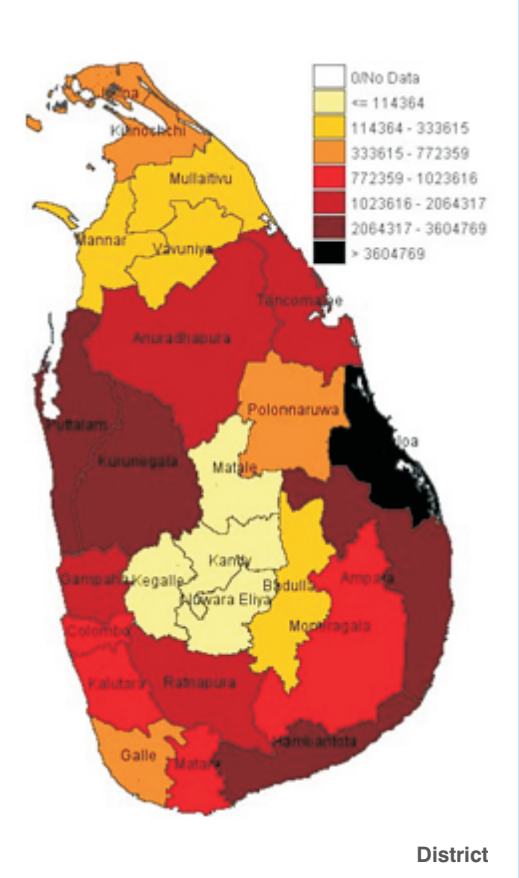
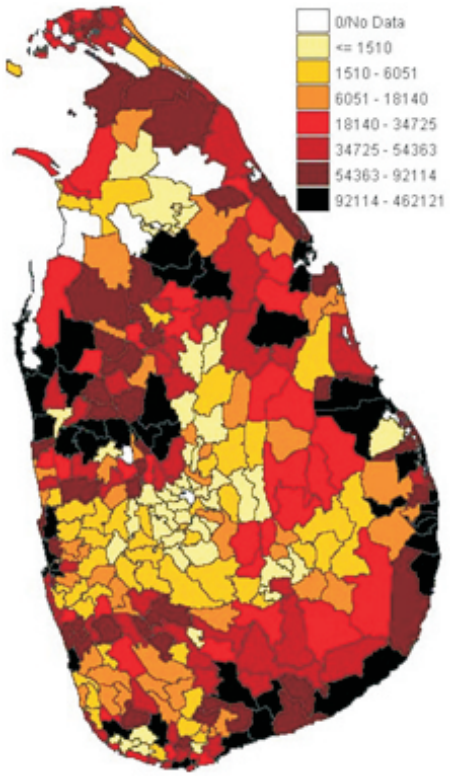
3.3.4 Spatial Distribution of People Affected

Map 10 illustrates the geographical distribution of people affected by disaster across the Districts and Divisional Secretariat Divisions in the country, respectively. It shows the uneven spatial distribution of human impact of disaster from less than 114,364 to more than 3.6 million (upper limit) disaster affected persons by districts and from less than 1,510 to more than 462,121 (Upper limit) by DSDs. The highest number of persons affected by disaster is recorded in the Batticaloa district while the districts of Kegalle, Matale, Kandy, and Nuwara Eliya appear to be the least affected. DS divisions in the Southern and North -Western parts of the island have a higher number of people affected. However, the magnitude of people affected is not distributed evenly throughout the island.

Map 10 : People Affected Due to Disasters - Spatial Distribution: 1974 - 2008



District



DS Divisions

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Box 3 : Conclusions on People Affected By Disasters

During the period of 1974-2008, the highest number of people affected was due to floods and next highest number of people affected has been due to drought, even though it was apparent as very insignificant in the Profile of Different Disaster Categories. Although the incidence of animal attacks is high, people are less affected by it. It is also important to note that people in Batticaloa are most affected by disasters whereas those in Kandy, Matale, Kegalle and Nuwara Eliya are least affected.

3.4 Loss of Life due to Disasters

3.4.1 Profile of Life Loss

Figure 23 shows the distribution of loss of life with respect to each disaster type. As seen in Figure 23-A, 90% deaths during the period from 1974 to 2008 is due to the Tsunami, which occurred for a few hours. The Figure 23-B shows the situation without Tsunami and the deaths appear to occur evenly - Extreme wind events (27%), Landslides (25%), and Animal attacks (25%). Seventy seven percent of total deaths due to disaster have resulted from the occurrence of these three disaster types. The proportion of loss of life from other disasters is not very significant compared to the above mentioned three disasters. Floods (12%) lightning (8%) and fire (2%) are other important disaster types with respect to loss of life

Figure 23-A : Profile of Loss of Life due to Different Disaster Categories Including Tsunami : 1974-2008

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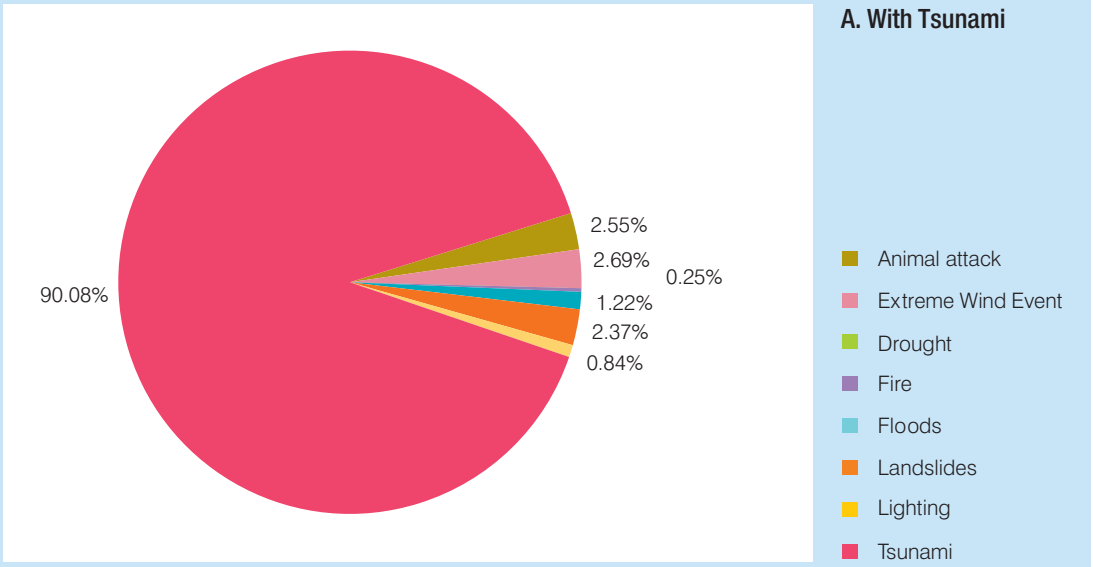

Figure 23-B : Profile of Loss of Life due to Different Disaster Categories Without Tsunami : 1974-2008

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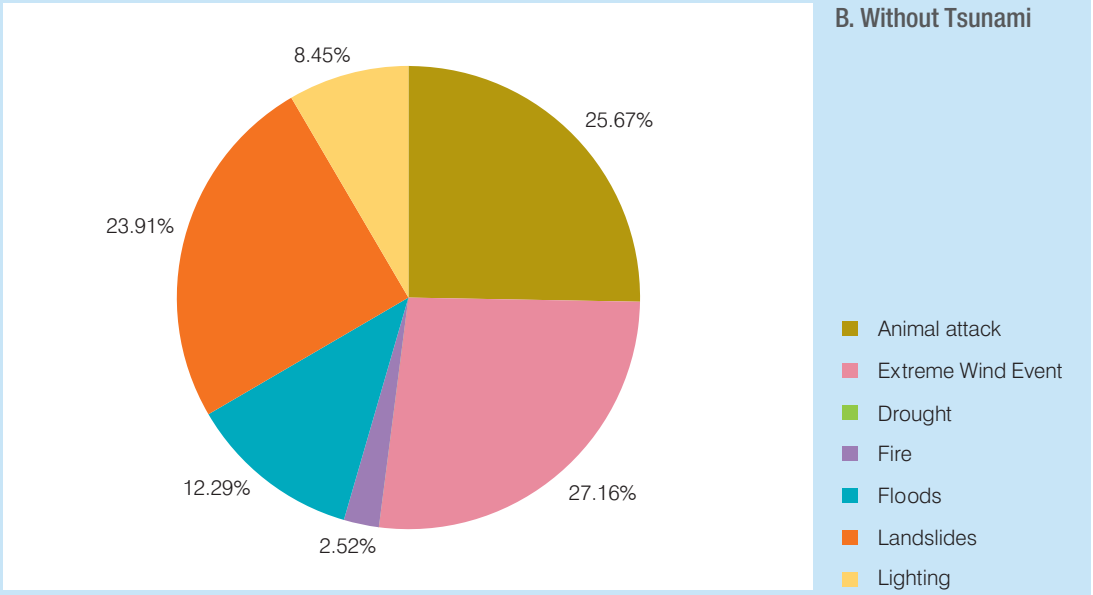

3.4.2 Annual Time Series Distribution

With respect to an annual time series distribution, the occurrence of deaths due to disaster has been quite low in general. As can be seen from Figure 24-B (without Tsunami), during the period 1974- 2008, deaths over 200 were reported in only three years, while in the remaining 27 years the annual death rate was below 100. The exceptional break in the normal annual distribution is seen in 1978 with a high death toll exceeding 900, mainly caused by extreme wind events. There are also two secondary level peaks in 1989 and 2003. Figure 24-A shows statistics with Tsunami

Figure 24-A : Loss of Life Due to Disasters - Annual Time Series Distribution

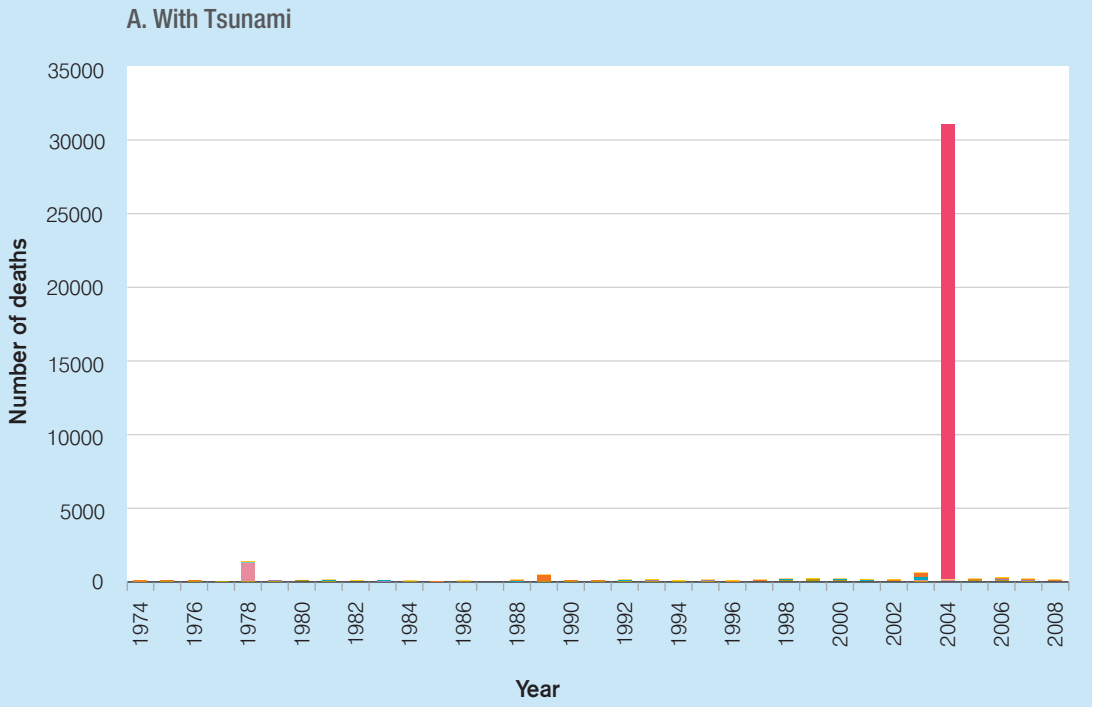

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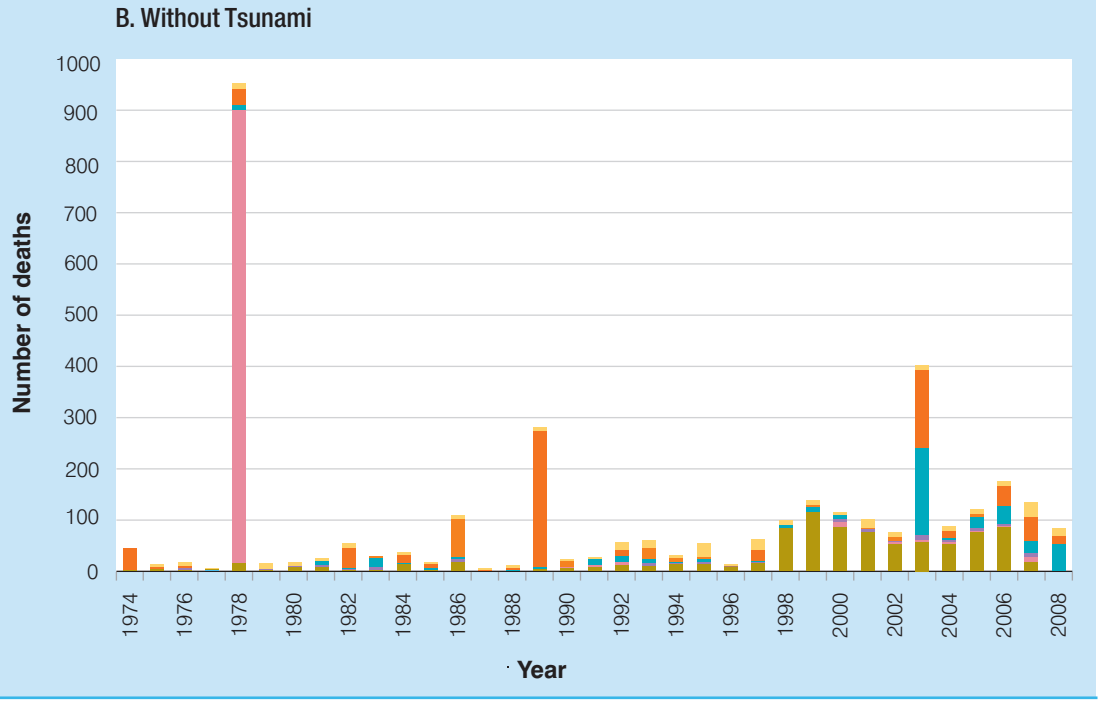
Figure 24-B : Loss of Life Due to Disasters - Annual Time Series Distribution



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3.4.3 Seasonal Distribution

The seasonal distributions of loss of life have been quite cyclical without the Tsunami as shown in Figure 25-B (without Tsunami). The month of November appears to suffer the highest loss of life which is mostly attributable to the extreme wind events. Apart from this, May and June have also experienced a higher rate of loss of life than the average monthly rate of loss of life. The lowest death rates were experienced during the periods December-March and July-October. The total picture completely changes with the Tsunami, as shown in Figure 25-A, showing December as the dominating month.

Figure 25-A : Loss of life Due to Disasters – Seasonal Distribution : 1974 to 2008

Tsunami
Lighting
Landslides
Floods
Fire
Drought
Extreme Wind Event
Animal attack

source
www.desinventar.lk

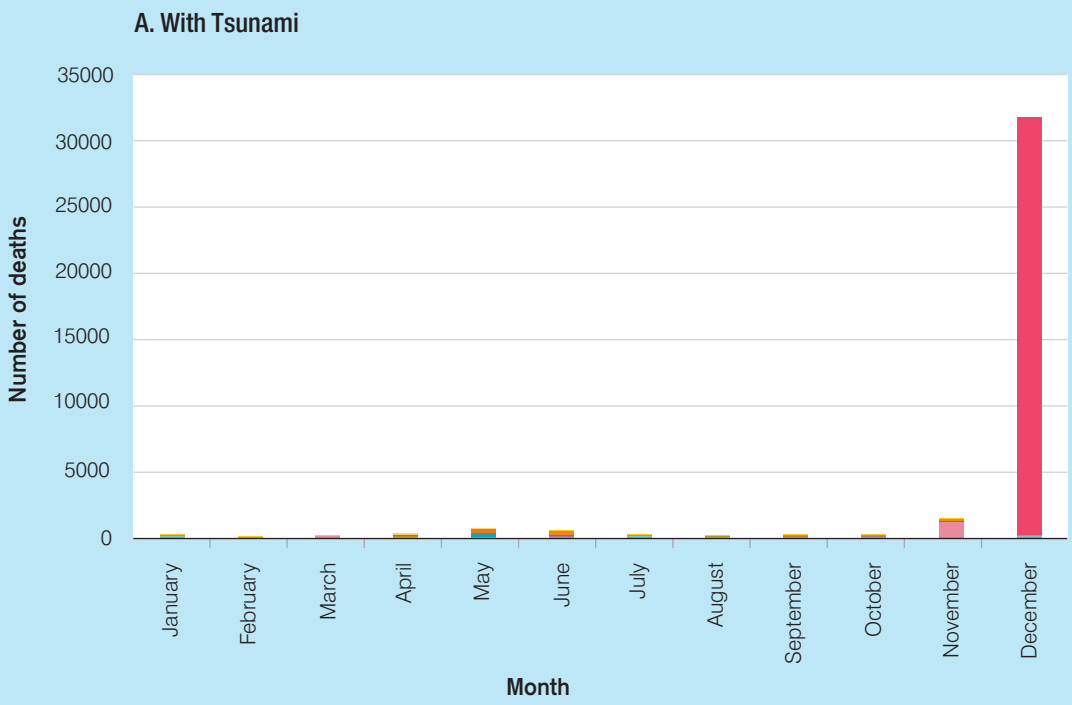

Figure 25-B : Loss of life Due to Disasters – Seasonal Distribution : 1974 - 2008

Lighting
Landslides
Floods
Fire
Drought
Extreme Wind Event
Animal attack

source
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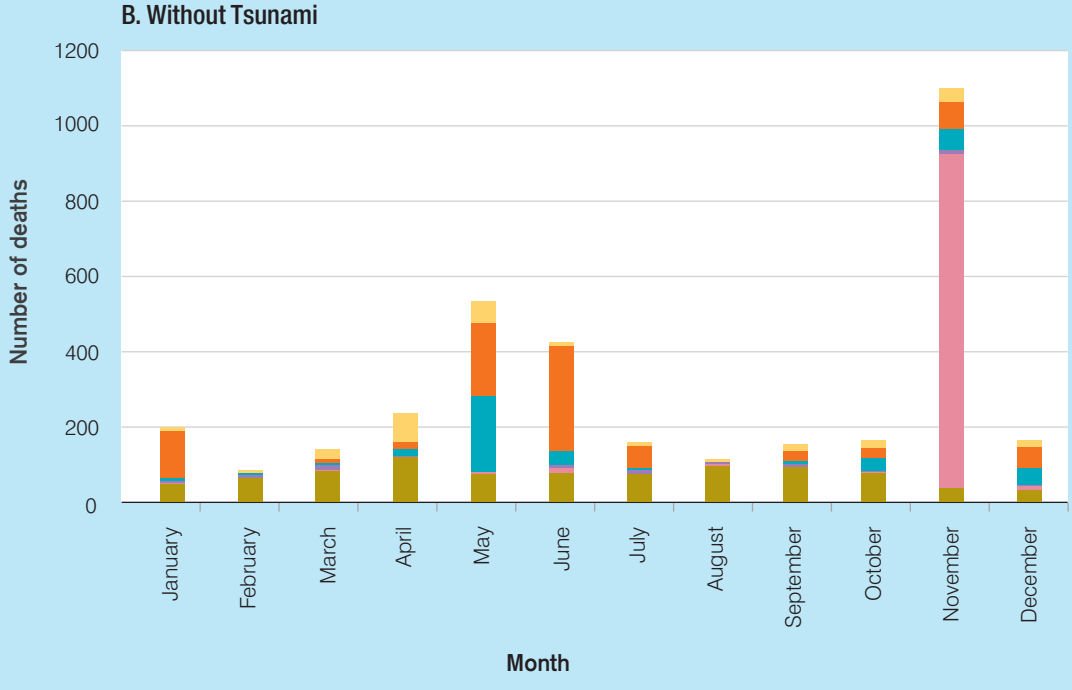
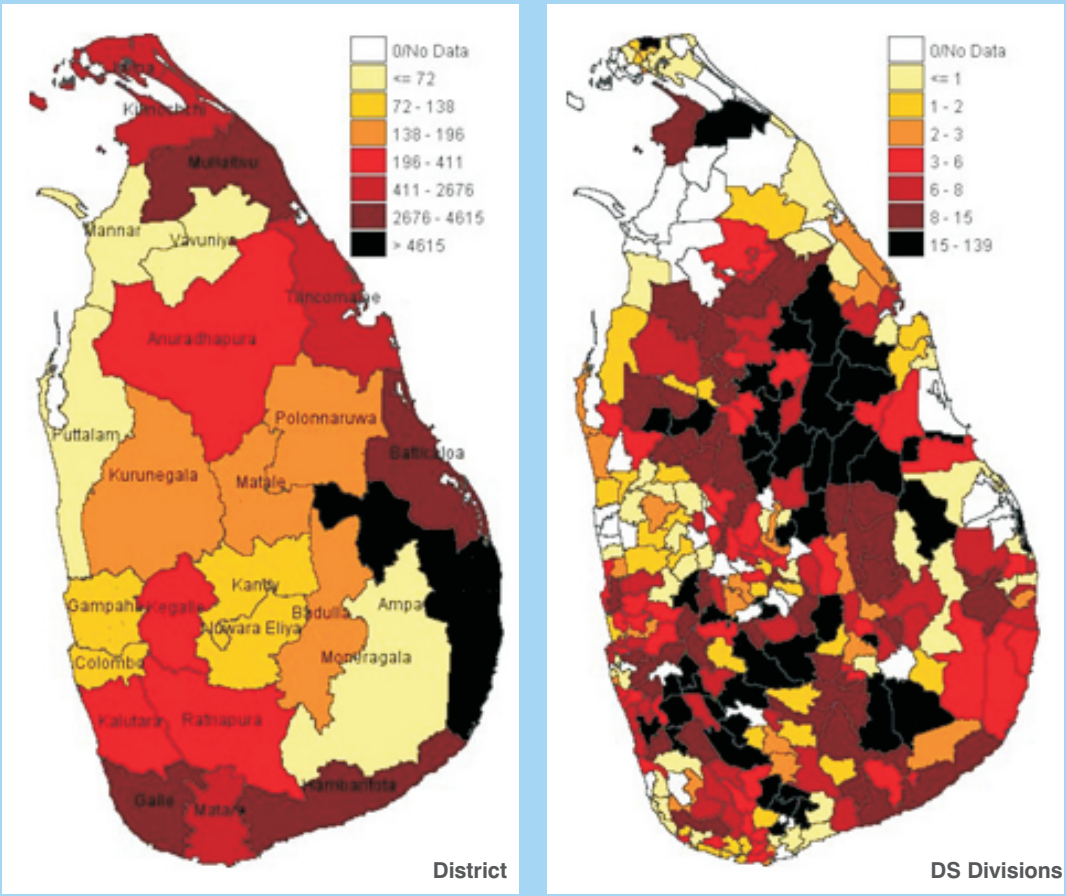


3.4.4 Spatial Distribution

Map 11 illustrates the geographical distribution of loss of life due to disasters across the Districts and Divisional Secretarial Divisions in the country respectively. It shows the uneven spatial distribution of loss of life by disasters between 1-72 deaths in Vavuniya, Mannar, Puttalam and Moneragala districts to more than 4615 deaths in the Ampara District, which has the highest number of recorded loss of life due to disasters. Very uneven distribution of loss of life is seen in the DS divisions ranging from more than 1 to and less than 139 recorded deaths.

Map 11 : Loss of life Due to Disasters – Spatial Distribution : 1974 - 2008



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Box 4 : Conclusions on Loss of Life Due to Disasters

Most number of deaths caused by disasters in Sri Lanka is due to the extreme wind events, landslides and animal attacks representing 77% of total loss of life (Without Tsunami). Uneven chronological, seasonal, and spatial distribution of recorded loss of life due to disasters is a common phenomenon showing a close link with the weather patterns in Sri Lanka, especially with the monsoon. Further, most deaths due to natural disasters have taken place in the districts of Ampara, Batticoloa, Hambantota and Galle (including Tsunami).

3.5 Houses Destroyed and Damaged by Disasters

3.5.1 Profile of Houses Destroyed and Damaged

Figure 26 shows the distribution of damages recorded to houses due to different categories of disasters. It can be seen that most damage occurring to houses are caused by the disastrous wind events, Tsunami and floods with a total of around 95% of total number of damage to houses by these three disaster categories. Without Tsunami also a total of around 95% of damaged houses are due to disastrous wind events and floods. Other important disaster types causing damage to houses are landslides and animal attacks. However, disasters such as fire, lightning and drought have not caused damage to houses.

Figure 26-A : % Profile of Houses Destroyed and Damaged Due to Disasters with Tsunami : 1974 -2008

source
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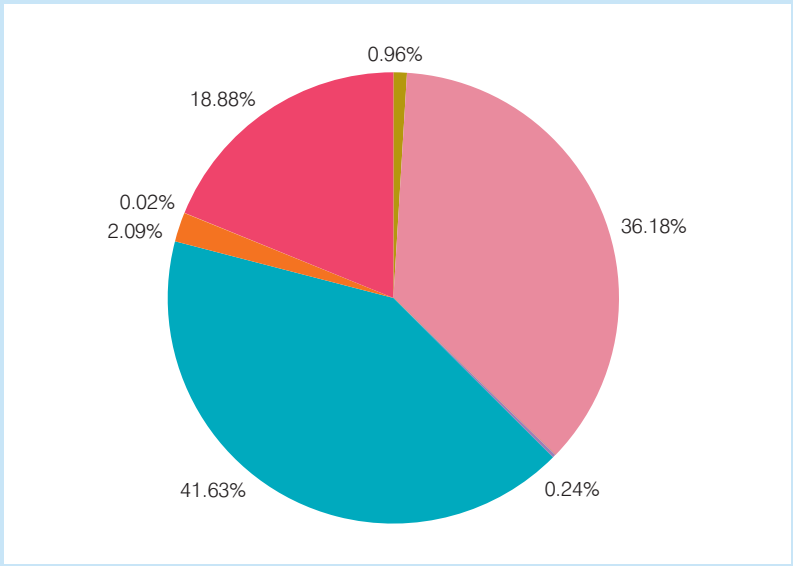

Figure 26-B : % Profile of Houses Destroyed and Damaged Due to Disasters without Tsunami : 1974 -2008

source
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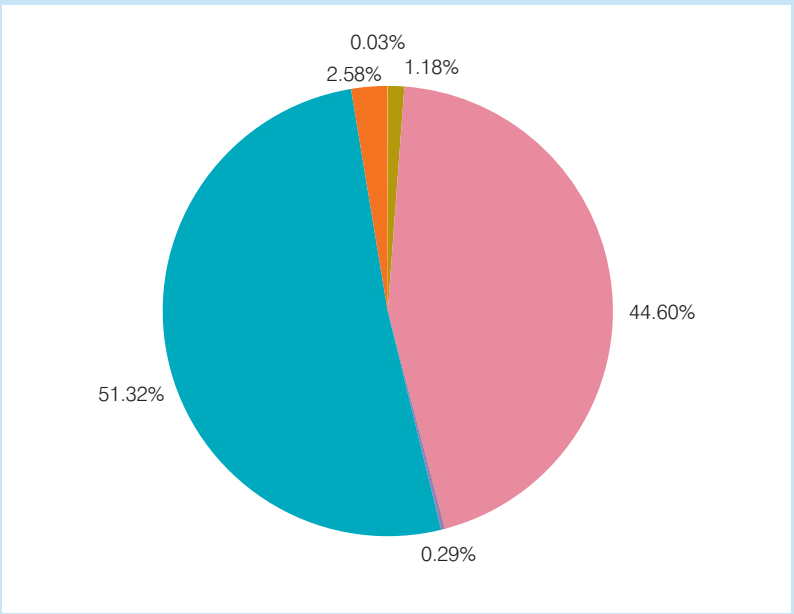


3.5.2 Annual Time Series Distribution

Over time building destruction appears to be quite low with an exception in 1978 and 2000. During these two periods, most destruction has been caused by extreme wind events. Apart from these two exceptional peaks most of the damage to houses is generally caused by floods.

Figure 27-A : No of Houses Destroyed and Damaged Due to Disasters with Tsunami - Annual Time Serie Distribution : 1974 - 2008

Tsunami
Lighting
Landslides
Floods
Fire
Drought
Extreme Wind Event
Animal attack

source
www.desinventar.lk

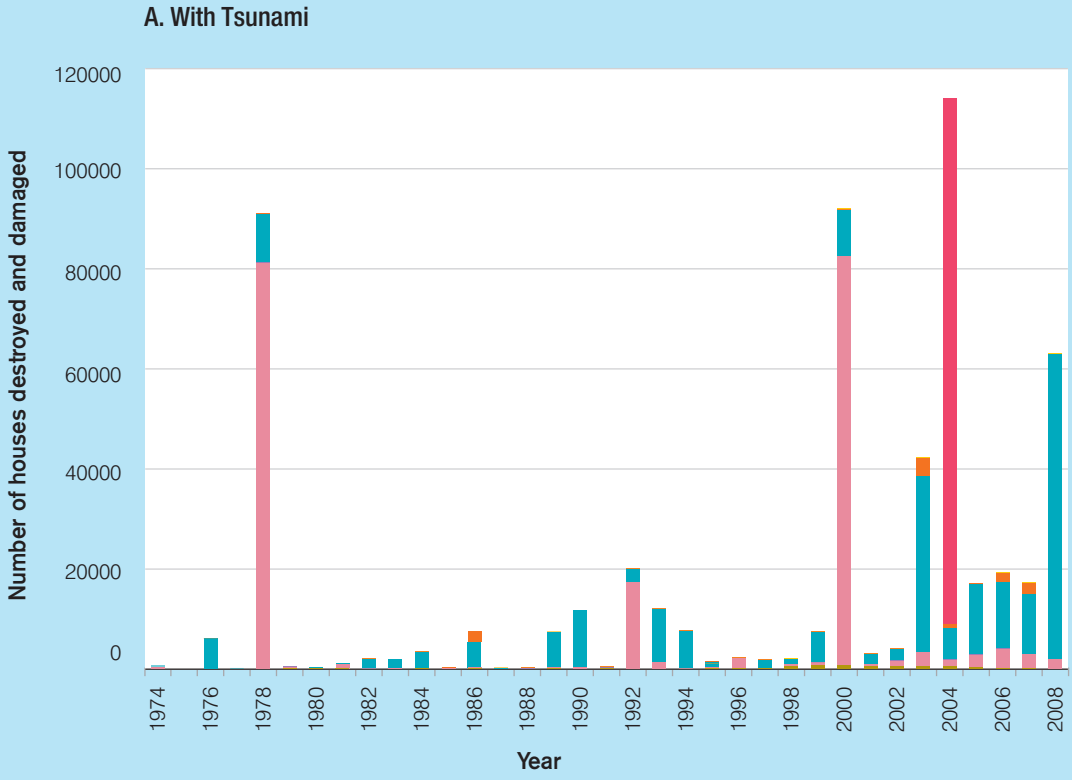
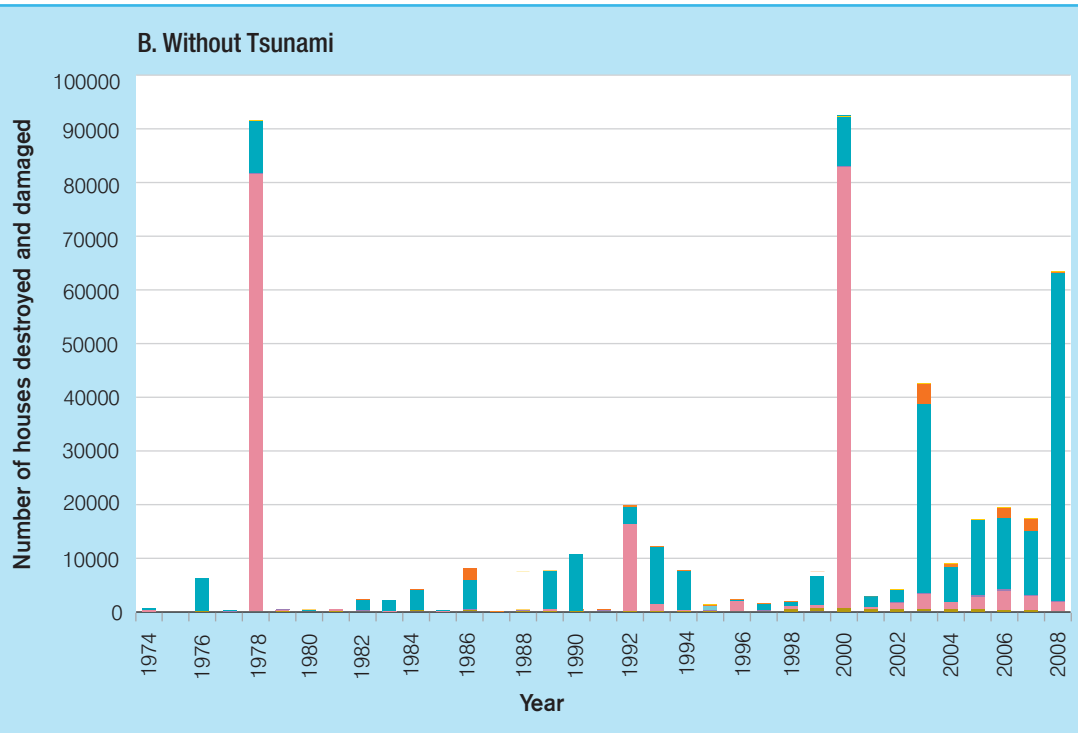


Figure 27-B : No of Houses Destroyed and Damaged Due to Disasters without Tsunami - Annual Time Series

Lighting
Landslides
Floods
Fire
Drought
Extreme Wind Event
Animal attack

source
www.desinventar.lk



3.5.3 Seasonal Distribution

The seasonal distribution appears to take on a cyclical pattern, as illustrated in Figure 28. Most destruction and damage are caused during the months of November, December and January and once again in May. In the first cycle, most damage appears to be caused by extreme wind events whereas during May most damage is caused by floods.

Figure 28-A : No of Houses Destroyed and Damaged Due to Disasters with Tsunami- Seasonal Distribution : 1974 - 2008

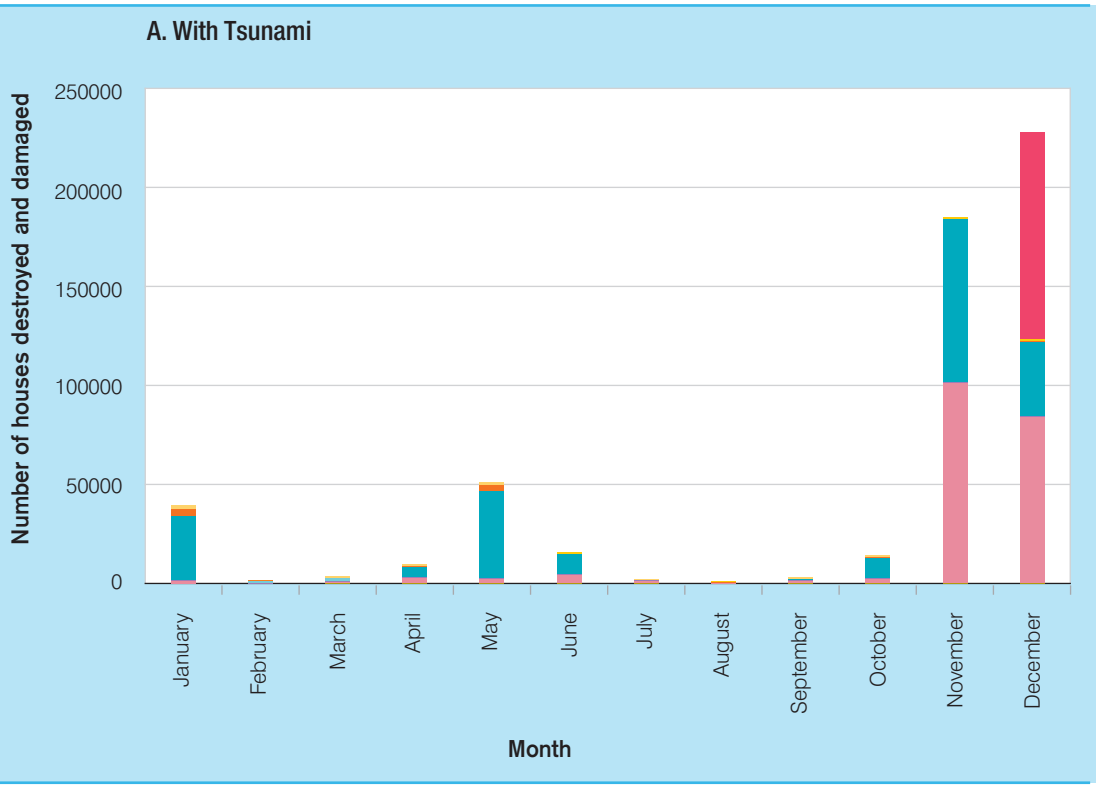


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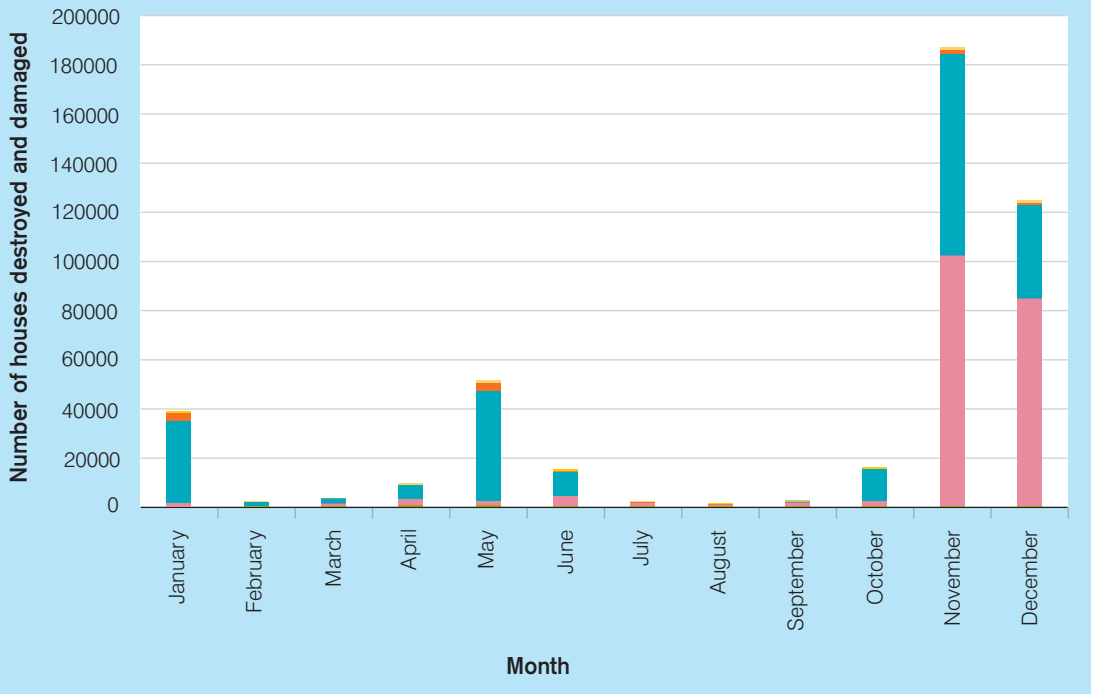
Figure 28-B : No of Houses Destroyed and Damaged Due to Disasters without Tsunami - Seasonal Distribution : 1974 - 2008



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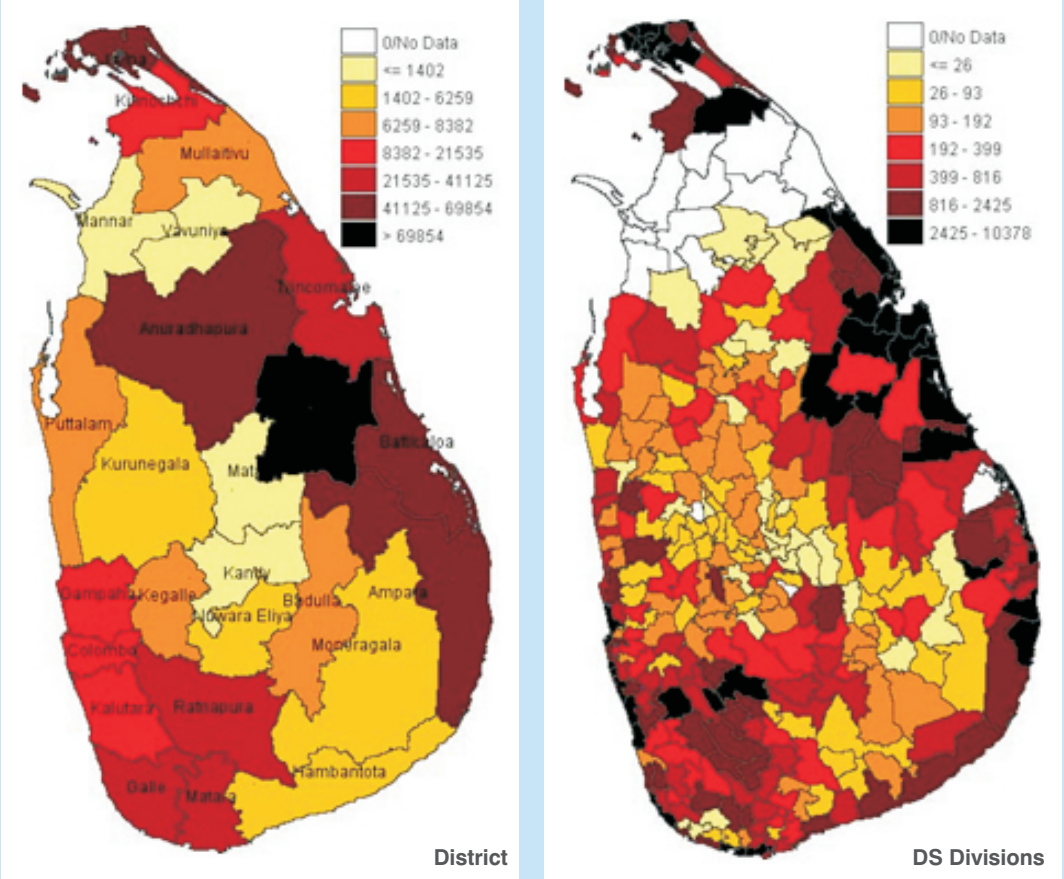
3.5.4 Spatial Distribution

Map 12 shows the spatial distribution with respect to damage to houses by disaster. It can be seen that the district most affected is Polonnaruwa, whereas districts such as Vavuniya, Mannar, Matale and Kandy are the least affected. Further, DS divisions located in the Northern districts and Eastern districts appear to have incurred very high damage to houses. However, some of the DS divisions in the Northern districts appear to be the least affected because of data availability.

Map 12 : Number of House Destroyed and Damaged Due to Disasters - Spatial Distribution : 1974 to 2008



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Box 5 : Conclusions on Houses Destroyed and Damaged by Disasters

About 95% destruction and damage to houses are caused by disastrous wind events, Tsunami and floods. Other important disaster types causing damage to houses are landslides and animal attacks. Except in 1978, 2000, and 2004, the general annual rate of damage and destruction appear to be quite low and in the two peaks of 1978 and 2000 most destruction has been caused by extreme wind events, whereas in 2004 high damage is due to Tsunami. In the remaining years the main cause for damage to houses is floods. The seasonal distribution appears to take on a cyclical pattern and most destruction and damage have occurred during the period of November, December, January and in May. The most affected district is Polonnaruwa, whereas, the districts such as Mannar, Vavuniya, Matale and Kandy are the least affected.

3.6 Losses to Agricultural Crops due to Disasters

3.6.1 Profile of Losses to Agricultural Crops

Damage to agricultural crops is measured as hectares of crops affected by the disaster events. Figure 29 shows the distribution of records of damage to agricultural crops due to various disasters (with Tsunami and without Tsunami). It appears to take on a similar pattern as damage to houses. It can be seen that most damage to agricultural crops are caused mainly by drought (52.2%), flood (38.9%) and extreme wind events (4.2%).

Figure 29-A : Profile of Agricultural Losses Due to Disasters (in Hectares) with Tsunami : 1974 - 2008

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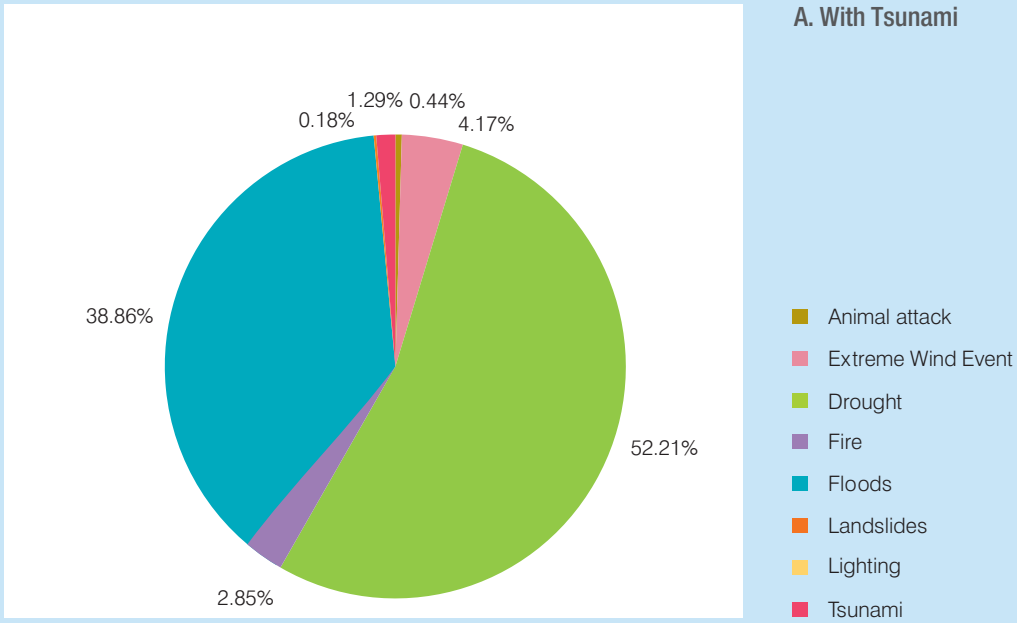

Figure 29-B : Profile of Agricultural Losses Due to Disasters (in Hectares) without Tsunami : 1974 - 2008

source
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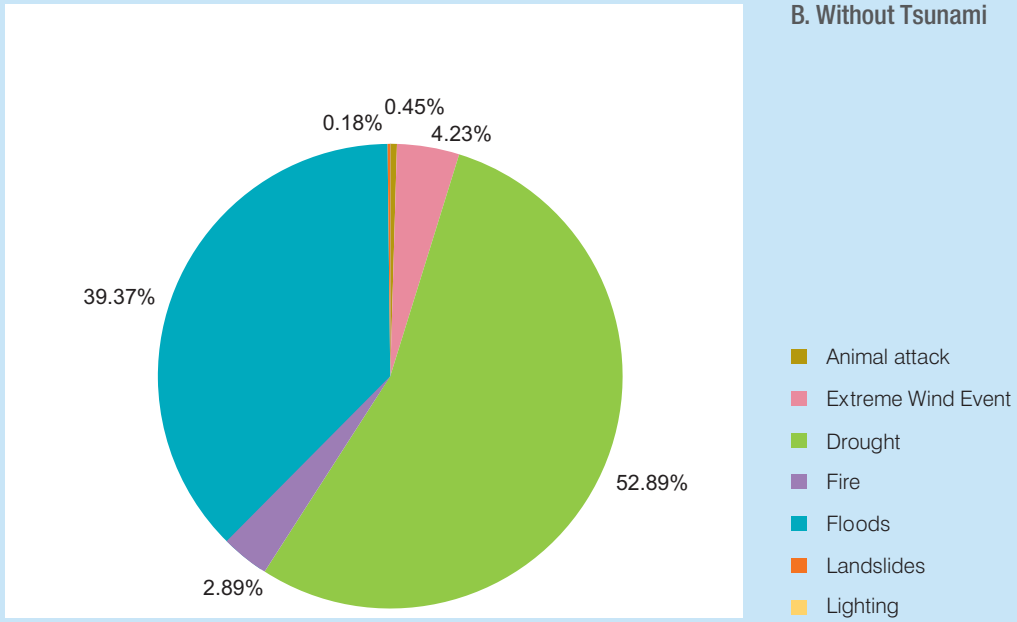

3.6.2 Annual Time Series Distribution

The annual time series distribution with respect to damage to agricultural crops illustrated in the Figures 30-A and 30-B (with Tsunami and without Tsunami), show a highly fluctuating pattern of damage / losses, from almost zero to reaching 12,000 Hectares of losses, with three peaks in 1987, 2001 and 2004. Further, most of the damage appears to be caused by droughts in these periods. However, in 1978 and 1984 most of the crop losses were caused by floods.

Figure 30-A : Agricultural Loss Due to Disasters (in Hectares) With Tsunami – Annual Time Series Distribution

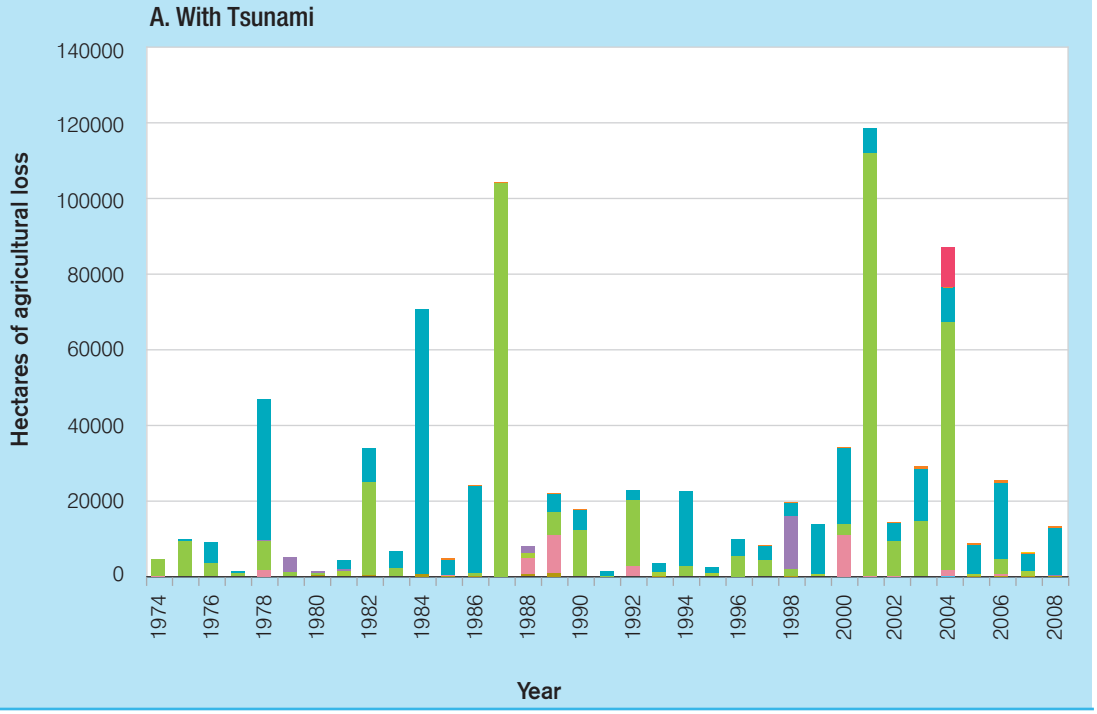

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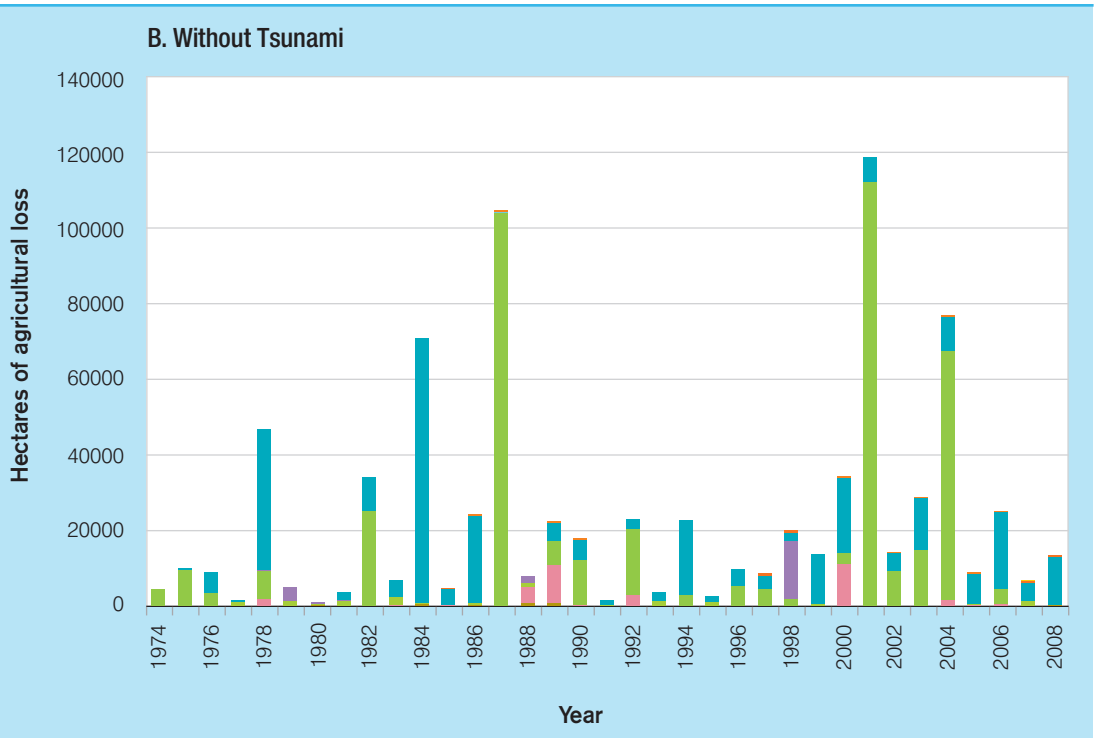
Figure 30-B : Agricultura Loss Due to Disasters (in Hectares) Without Tsunami – Annual Time Series Distribution



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3.6.3 Seasonal Distribution

The seasonal distribution of damage to agricultural crops due to disasters also appears to be cyclical. One peak takes place in the months of November, December, January, and February. During this period, most damage is caused by floods which can be attributed to the monsoon rains. The other peak can be seen in August and September. Here, however, most of the agricultural loss is due to drought. Since August and September are the harvesting months, a slight drought would cause a significant crop loss.

Figure 31-A : Agricultural Loss Due to Disasters (in Hectares)With Tsunami - Seasonal Distribution: 1974 - 2010

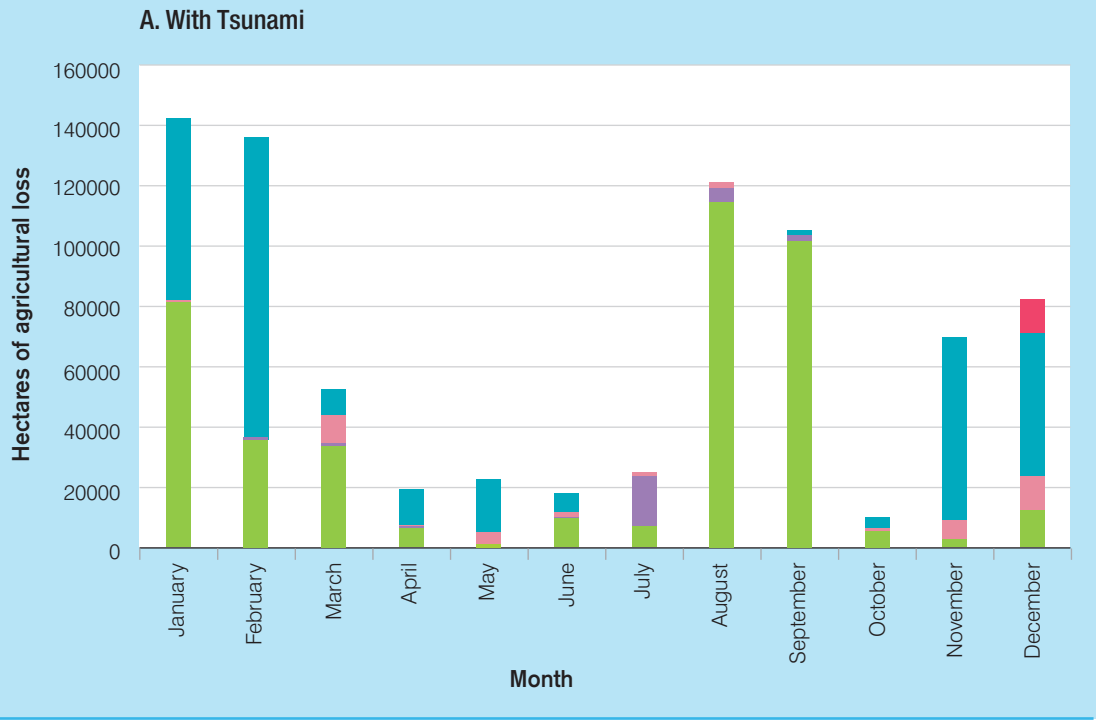

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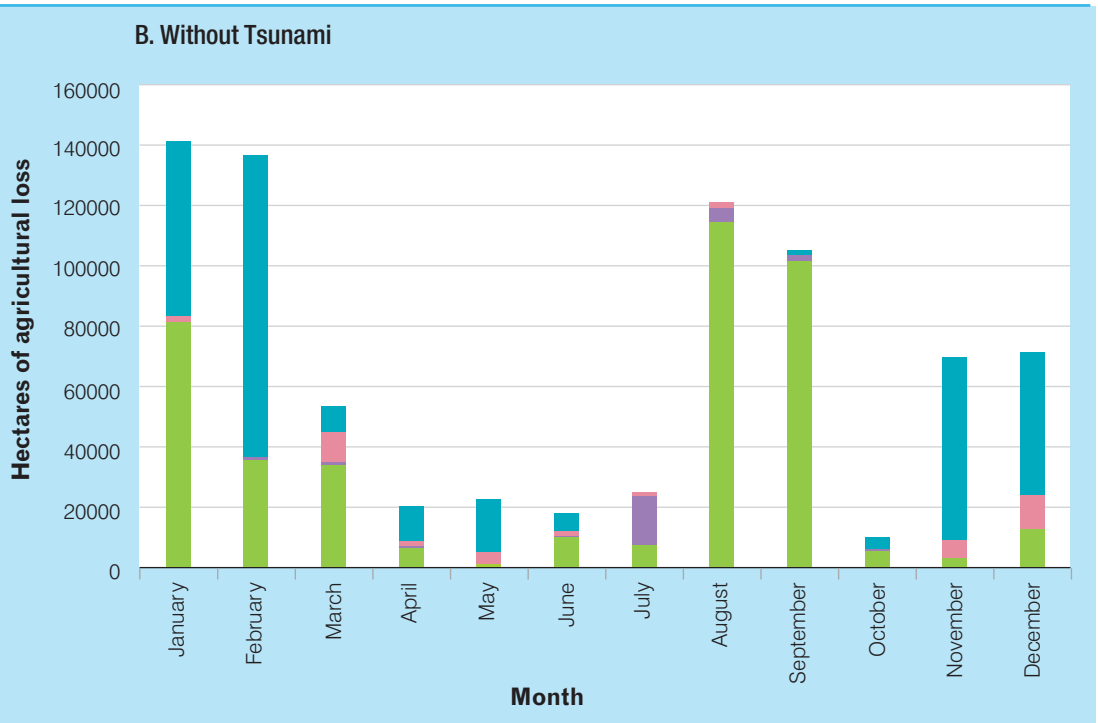
Figure 31-B : Agricultural Loss Due toDisasters (in Hectares) Without Tsunami - Seasonal Distribution: 1974 - 2010



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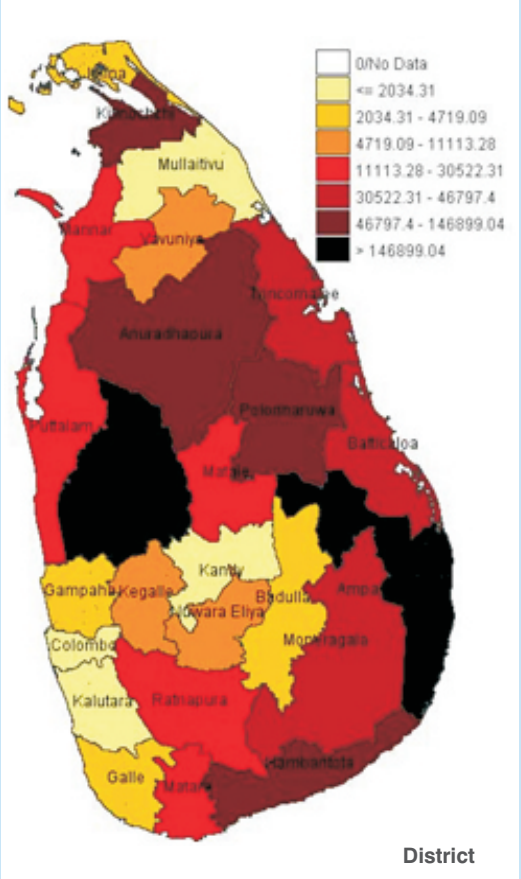
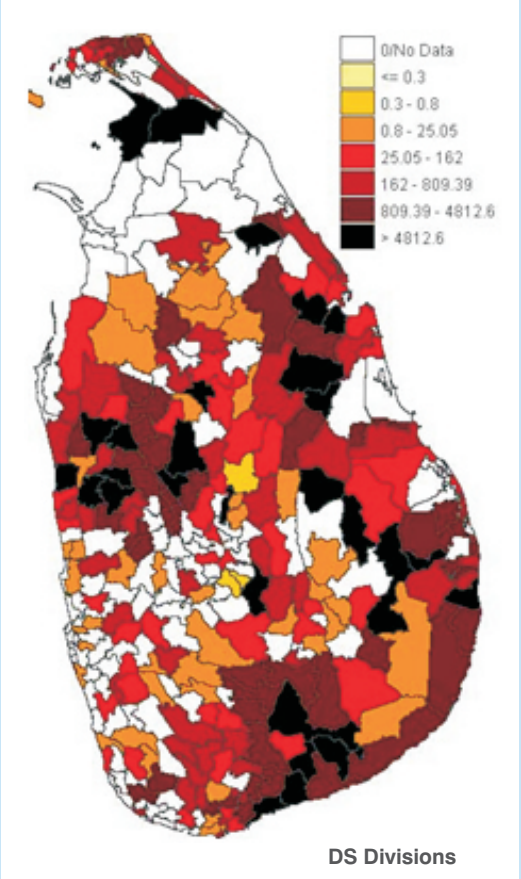
3.6.4 Spatial Distribution

The spatial distribution shows that the districts of Kurunegala and Ampara appear to have the highest damage to crops (Map 13). In districts such as Colombo, Kandy and Kalutara the loss is rather low. This is because the agricultural sector is not as significant in these districts as in other districts. Further, the most affected DS divisions are located in the Southern and Western parts of the island, while certain DS divisions in the Northern and Eastern parts of the island are less affected.

Map 13 : Agricultural Loss Due to Disasters (in Hectares) - Spatial Distribution: 1974 - 2008



District



DS Divisions

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Box 6 : Conclusions on Losses to Agricultural Crops due to Disasters

Mainly drought (52.2%), flood (38.9%) and Extreme wind events (4.2%) cause damage to agricultural crops. The annual time series distribution with respect to agricultural crop loss takes on a cyclical pattern with three peaks in 1987, 2001 and 2004 and damage appears to be mainly caused by drought and flood.

The seasonal distribution of loss to agricultural crop shows a cyclical distribution with two peaks. One peak takes place in the months of November, December, January and February due to both drought and flood. During this period, most damage is caused by floods which can be attributed to the monsoon rains. The other peak can be seen in August and September mainly due to drought.

The spatial distribution shows that the districts of Kurunegala and Ampara appear to have the highest loss of crop. In districts such as Colombo, Kandy and Kalutara the loss is somewhat low. This is because the agricultural sector is not as significant in these districts as in other districts.