

Thunderstorm & Lightning network- Karnataka

Lightning is a hydro-meteorological global phenomenon mostly common in tropical countries. India has mostly a tropical climate and varied geography and hence is highly prone to lightning and thunderstorms. Lightning is a routine part of weather whenever there is instability in the atmosphere which is more common during the transition from one season to another. India being a monsoon-dominant country, and lightning is intimately associated with the monsoon. After a hot summer, as the monsoon advances, along with rain, lightning strikes are an integral part of it.

The occurrence of lightning has significantly increased in frequency and intensity. This rise is mainly due to an increase in extreme climate events attributable to global warming, depletion of water bodies, deforestation, pollution and environmental degradation.

Thunderstorm and Lightning have emerged as one of the major weather hazard in recent years and have affected many parts of the Country. IMD data (1950-1980) shows that more than 80 thunderstorm and lightning days occur over the northeast, and some parts of Kerala, Jammu & Kashmir each year. In India, the mortality due to thunderstorm and lightning is more than 2,500 people every year. As per recent studies, lightning activity have shown increasing trend over India in past two decades.

Lightning-related mortality of humans and animals has been high and more so has shown a rising trend. Most of the deaths are recorded in rural areas of farmers, cattle grazers, fishermen, laborers, and children. The National Crime Record Bureau (NCRB) report's mortality data from 1967 to 2021, showing that there has been a sharp rise in fatalities in recent years. Lightning fatalities since the last three years are almost steady around 2800 plus.

Thunderstorms & Lightning in Karnataka

Thunderstorm & Lightning strikes have been causing loss of life and property in Karnataka as well. About 910 people have died due to lightning strikes in the Karnataka State during 2011-2022. Considering the extent of vulnerability & severity to the communities especially in the rural areas, Government of Karnataka has notified the Lightning is a State specific natural disaster. Apart from the loss of life, there is a huge loss of livestock as well as infrastructure due to lightning strikes in the State every year.

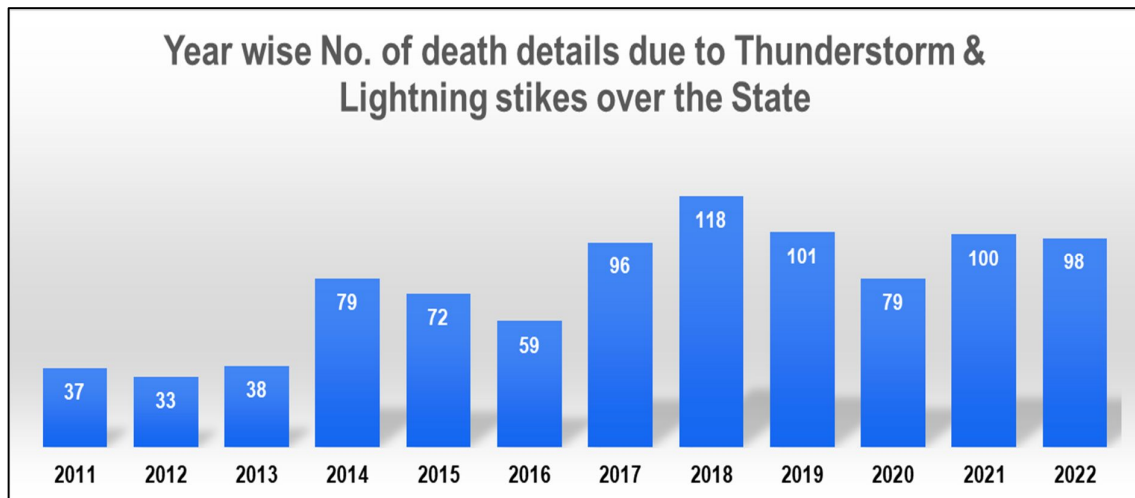


Fig 1: Year wise No. of deaths due to Thunderstorm & Lightning in the State.

Rural and forest areas are the most vulnerable given the presence of tall trees and water bodies. A majority of the lightning victims are people working in the fields in rural areas. For example, a study has shown that 96% of the total lightning-related deaths in the Country were reported from amongst people working in the fields mainly farmers in rural areas are more. Lightning is also a major cause of electrical power breakdowns and forest fires.

Lightning has been generally observed in most of the part during second half of the day. However, during intense cloud movement with high wind speed, especially during monsoon and cyclonic activities, lightning may occur anytime. Lightning also

depends on local geographical conditions like its different in coastal region, hilly areas and river basins

Lightning Early Warning System (LEWS) - Karnataka

In order to mitigate the losses due to Lightning strikes in the State, Karnataka State Natural Disaster Monitoring Centre (KSNDMC) has taken up a project to provide location specific Early Warnings to the Government Executives and general public across the State. The project has been initiated during June 2018 and installed a network of eleven Lightning Detection Sensors across the State and providing thunderstorm and lightning data (Cloud to Cloud and Cloud to Ground) to KSNDMC server on real time. Based on the real time data the advisories are being generated and disseminated to the public.

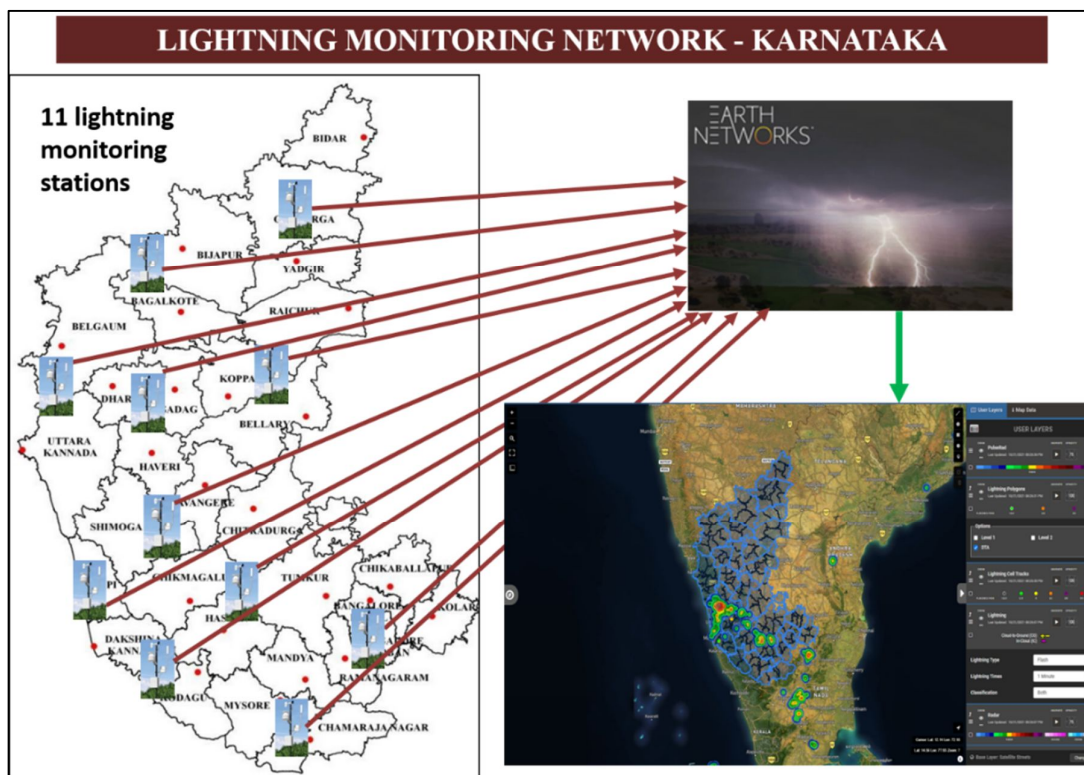


Fig 2: Lightning network in Karnataka

During the last three years (2020-2022) through the LEWS- Karnataka network the total lightning (C—G) strikes observed all across the State. The Belagavi and Dakshina Kannada districts of the State experienced the maximum number of C-G strikes. The

maximum lightning (C-G) strikes were observed during Pre- Monsoon (March – May) and NE- Monsoon (October- December) period.

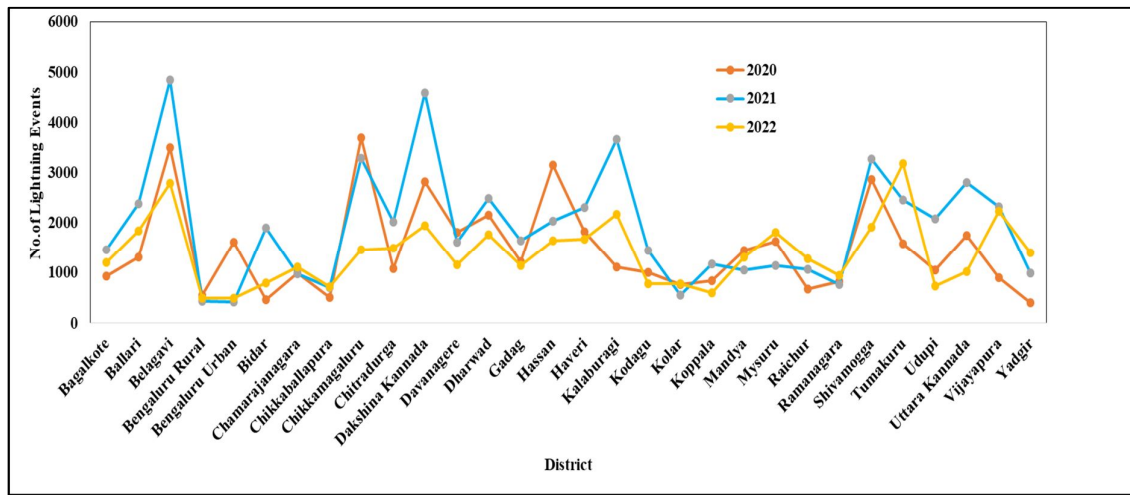


Fig 3: Summer (March - May) season district wise observed lightning C-G events (2020 - 2022) over the State.

A dedicated link for sferic maps for lightning and thunderstorm events for to visualize in real time available for the State. Using these credentials, development of thunderstorm cell and its projection for movement of cell track and likely influencing area and type of lightning (C-C or C-G) also can be seen. Weather and satellite product layers also available, so that it is help full about track the movement of the thunderstorm cell and severity. In a nutshell the user can get more information about thunderstorm and lightning developments using sferic maps.

For effective dissemination of early warnings to the potentially vulnerable panchayats, KSNDMC has developed a unique integrated public alert and warning system called Disaster Early Warning System (DEWS). DEWS will provide rapid, reliable and effective communication to the public in case of major emergencies such as natural disasters like Floods, Heavy releases from upper catchment reservoirs/ Dams, Hailstorms, Earthquakes, Heavy rains, Lightning & Thunderstorms and Heat waves.

Through DEWS, potentially vulnerable panchayats were equipped by the integrated announcement systems. This system has features like text to speech, recording service, automated message service, scheduled broadcast of messages & group broadcasting. These pre-defined features will be issued during, pre & post disaster events, whenever crossing the limits of defined threshold values. The warning messages will be broadcasting to outdoor receivers with loudspeakers automatically using DEWS system at that particular Gram Panchayath office before any disaster takes place, with the help of the existing high dense weather observational, water level data, Lightning monitoring network and forecast mechanism in the State.

A dedicated team of operators along with technical officer monitors regularly and will follow the criteria for each disaster and issue alert/ early warning accordingly to the likely affected community/area in advance to effectively minimize the loss of life and property in the State.

Dissemination of information plays an important role in Disaster Risk Reduction. KSNDMC has dissemination mechanism in various methods to issue early warnings to all the stakeholders in real time, such as area specific SMS alerts, VAUNAMTRA call Centre, Apps, email alerts, social media platform and based on the real time lightning data, KSNDMC has developed Mobile App “SIDILU” for disseminating the location specific information about Lightning Strikes in the State. Apart from the Early Warnings, the App also provides the advisory about the safety measures in the form of Do’s and Don’ts to the public which will help public to secure themselves during the Lightning activity to their location.



Fig 4: Different modes of dissemination of Information

The SIDILU APP will also disseminate the Early Warnings through **SMS** to the mobile phones of the Panchayath Development Officers (PDO's) and Revenue Inspectors (RI's) of the respective Grampanchayath. Early Warning about the lightning strikes will also be disseminated to the public in regional language through 24 x 7 Interactive Help Desk "**VARUNA MITRA**" operational at KSNDMC. The database, customized to every Grampanchayath, of about 28 lakh farmers / general public available at KSNDMC will also be used for disseminating Lightning Strike Early Warning.

The app offers a comprehensive map view of the real time occurrences of lightning(s) around the user's current geo location within Karnataka. The concentric circles at the center of the map view show the lightning occurrences that span from a radius within 1 KM (RED – high danger); within 5 KM (ORANGE – moderate danger); within 15 KM (YELLOW – still within overall dangerous zone) from the user's current geo location. If there are lightning occurrences happening within any of these radiating circles, push notifications will be sent to the mobile user, bringing his/her attention to the severe weather occurrence.

This app can be downloaded free of cost from the Google Play store. The app issues warnings to smart phone users 30 to 45 minutes before the lightning strike by

displaying information in different colors. An alert in red indicates that the user is in danger zone as there is a 90% probability of a lightning strike within one km radius of the location. Orange shows the possible occurrence of the strike within 5 km radius and yellow in 15 km radius. At present, more than 10,000 android phone users benefiting from this app.

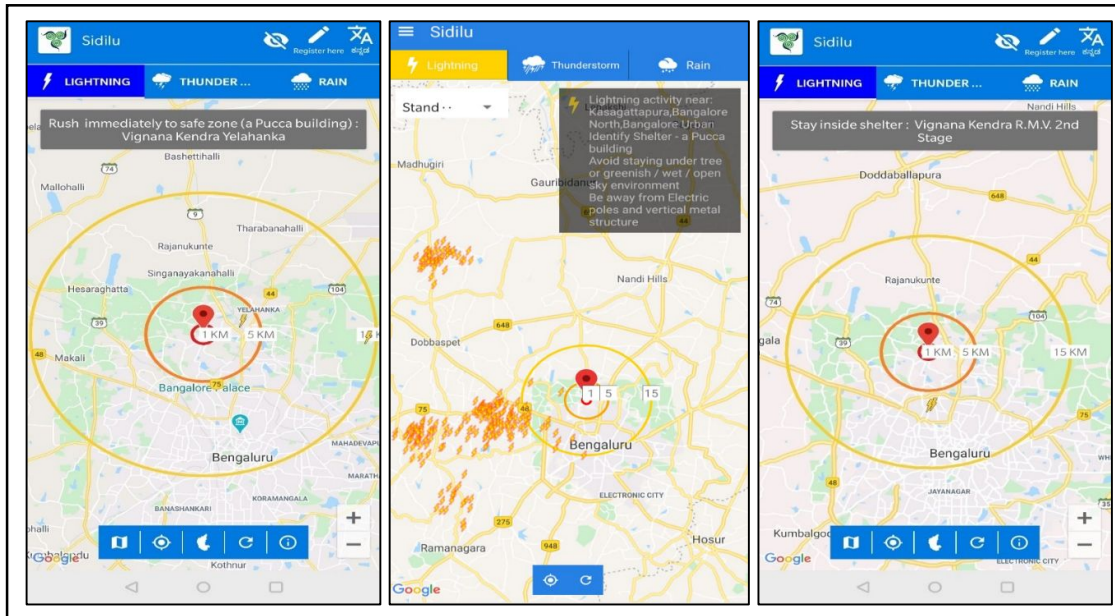


Fig 5: Year Screenshots of the App SIDILU

The C-G events were mapped district wise during June-2018 to Dec-2022. Based on these events, using GIS techniques; potentially vulnerable areas identified and more focus is being giving through DEWS and along with this in near future planning to conduct awareness programs and to take appropriate mitigating measures to minimise the impacts on humans, livestock & property.

Thunderstorm & Lightning: Do's and Don'ts

If at home or work

Preparation

- Look for darkening skies and increased wind.
- If you hear thunder, you are close enough to be struck by lightning.
- Keep monitoring local media for updates and warning instructions.
- Stay indoors and avoid travel if possible.
- Close windows and doors, and secure objects outside your home (e.g. furniture, bins, etc.).
- Ensure that children and animals are inside.
- Unplug unnecessary electrical appliances (to isolate them from the main power supply which may conduct a power surge during a lightning storm).
- Remove tree timber or any other debris that may cause a flying accident.

Response

- Avoid taking a bath or a shower, and stay away from running water. This is because lightning can travel along metal pipes.
- Keep away from doors, windows, fireplaces, stoves, bathtubs, or any other electrical conductors.
- Avoid using corded phones and other electrical equipment that can conduct lightning.

If Outdoor

Response

- Go to safe shelter immediately – avoid metal structures and constructions with metal sheeting.
- Ideally, find shelter in a low-lying area and make sure that the spot chosen is not likely to flood.

- Crouch down with feet together and head down to make yourself a smaller target.
- Hair standing up on the back of your neck could indicate that lightning is imminent.
- Do not lie flat on the ground; this will make a bigger target.
- Keep away from all utility lines (phone, power, etc.), metal fences, trees, and hilltops.
- Do not take shelter under trees as these conduct electricity.
- Rubber-soled shoes and car tyres do not offer protection from lightning.

If travelling

Response

- Get off bicycles, motorcycles or farm vehicles that may attract lightning.
- Get to a safe shelter.
- If boating or swimming, get to land as quickly as possible and take shelter.
- During a storm, remain in your vehicle until help arrives or the storm has passed (the metal roof will provide protection if you are not touching metal inside); windows should be up; park away from trees and power lines.

Treatment

- Take the person who is struck by lightning to a hospital.
- If possible, give basic First Aid.
- People struck by lightning carry no electrical charge and can be handled safely.
- Check for broken bones, loss of hearing and eyesight.
- A victim of a lightning strike can suffer varying degrees of burn. Check the impact point and where the electricity left the body for injury marks.

-----End of the report-----