Chapter - VII
Other disasters affecting the State

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The other disasters such as cyclones and lightning affecting the State are dealt with in this section. The National Cyclone Risk Mitigation Project which aimed to enhance coastal resilience faced implementation challenges leading to delays, reduced coverage, and unmet objectives.

The data available with the Government on loss of lives due to lightning was unreliable. The alert mechanism in place for lightning was not robust due to insecure contracts and inappropriate early warning alerts. Delay in bringing out the Action Plan coupled with absence of follow-up on the action points by the Government exposed communities to continued danger from lightning.

In addition to the significant disasters that are discussed in the earlier chapters, the State had also experienced the impact of other major calamities such as cyclones, lightning strikes, *etc*. This chapter highlights the evaluation of disaster risk reduction mechanism in connection to other vulnerable calamities.

7.1 Cyclone

Karnataka has a coastal line of 322 km running through three districts[47] of the State. The high density of population along the coastline of Karnataka has made the population highly vulnerable to storm surge and high-speed winds accompanied by cyclone. Further, any severe cyclone along the eastern coastline of the country causes heavy rainfall in the interior Karnataka region resulting in damages to crops, buildings and infrastructure services such as roads and often the impact would be severe disruption in the socio-economic life in these regions. The State's coastline was affected by a series of cyclones *Ockhi* (2017), *Kyarr* and *Maha* (2019) and *Tauktae* in May 2021. Of the test-checked districts, Dakshina Kannada was the only district exposed to cyclone vulnerability.

While cyclonic storms can neither be avoided nor controlled, there is a wide scope for the administrations to be vigilant through appropriate and adequate preparedness to reduce the disaster risk and damage.

❖ **Preparedness/mitigation measures for cyclones**

Weather forecasting and early warning alert mechanism play a significant role in management of cyclones and disaster risk reduction.

7.1.1 National Cyclone Risk Mitigation Project

The Government of India launched (2011) the National Cyclone Risk Mitigation Project (NCRMP) with World Bank assistance[48] to reduce vulnerability of coastal communities to cyclones and other hydro meteorological hazards through four main components: a) Early Warning Dissemination Systems (EWDS), b) Cyclone Risk Mitigation Infrastructure (CRMI), c) Technical Assistance for Capacity

[47] Dakshina Kannada, Udupi and Uttara Kannada.

[48] As an Adaptable Programme Loan (APL) with an International Development Association (IDA) credit.

Building on Disaster Risk Management and d) Project Management and Implementation Support (managed by Ministry of Home Affairs).

Karnataka was identified (2015) under Phase II of the project and was classified as a lower vulnerability State to cyclone hazard based on the frequency of occurrence of cyclone, size of population and the existing institutional mechanism for DM. The project was to be completed by the end of March 2022. The total outlay for the project implemented in the State through the Revenue Department (DM) was ₹166.49 crore for the period 2015-16 to 2023-24.

7.1.1.1 Release and Expenditure

The State Government delayed launching of the programme though GoI had started releasing funds since 2015-16 and the reasons therefor were not forthcoming from records made available to Audit. The delay in implementation resulted in the project period being extended persistently, till August 2023 and thereby denying the anticipated benefits to the vulnerable community. The delay in implementation of the project also resulted in denial of protective measures to the coastal population against the *Okhi, Kyarr* and *Taukte* cyclones which affected the State's coastal region. As of August 2023, audit observed that a total amount of ₹156.04 crore was released and an expenditure of ₹138.72 crore had been incurred on the project. Year-wise details of release of funds and expenditure thereon under this programme are furnished in **Table 7.1** below**.**

Table 7.1: **Year-wise details of fund releases and expenditure under NCRMP**

(₹ in crore)

Year	Releases		Total releases	Expenditure
	GoI	GoK		
2015-16	1.20	0.00	1.20	0.00
2016-17	11.25	0.00	11.25	0.00
2017-18	37.36	0.00	37.36	10.39
2018-19	14.50	0.00	14.50	17.87
2019-20	34.95	0.00	34.95	20.68
2020-21	0.75	0.00	0.75	47.95
2021-22	14.00	20.00	34.00	19.03
2022-23	14.02	5.23	19.25	22.80
2023-24	0.00	2.78	2.78	0.00
Total	**128.03**	**28.01**	**156.04**	**138.72**

Source: Data furnished by the NCRMP Cell, Revenue Department

7.1.1.2 Implementation of the project

Scrutiny of records made available to audit showed the following:

- The tender for EWDS was notified only in July 2019 after a delay of more than three years since the commencement of the project. There was an inordinate delay in execution of contracted works by the contractor[49]. To avoid further delay in completion of the project which required construction of A-category towers[50], the essential component of Digital Mobile Radios (DMRs) was deleted from the scope of the contract and the department decided to install only the alert sirens on towers owned by BSNL. As a result, the outlay towards

[49] M/s. Broadcast Engineering Consultants India Limited - BECIL, Noida.
[50] Towers which can withstand high speed wind during cyclones.

EWDS was reduced from ₹24.97 crore to ₹11.51 crore. Furthermore, the decision to reduce the number of towers as well as delete DMRs from the scope of the project from originally proposed 73 to 30 had diminished the coverage of communities by more than 50 *per cent*.

As of August 2023, though the EWDS were reportedly installed, they was not trial tested for proper functioning, as the vendor did not provide the necessary authorization since the payment for supply/installation was yet to be made.

- As per the details furnished by the department, all the works taken up under CRMI component were completed (August 2023). It would be appropriate if the road works executed under the project provided connectivity to Multi-Purpose Cyclone Shelters (MPCS) to enable the beneficiary community to immediately reach the shelter whenever a cyclone hits the coastal region. However, the six roads constructed in the test-checked district of Dakshina Kannada were not provided with direct connectivity to MPCSs constructed for sheltering the fishermen during distress. The DC, Dakshina Kannada stated (July 2023) that the district administration was not consulted for selection of roads.
- The project outlay included providing shelter level equipment[51] to each MPCS at a total cost of ₹2.20 crore. None of the proposed equipment were supplied to any of the MPCS. The absence of the equipment denied the vulnerable community, of preparedness for emergency situations at the local level and hampered conduct of mock drills.

In the meantime, the GoI/NDMA instructed to close the implementation of the project by August 2023. Audit observed that the contractor was paid only a sum of ₹1.55 crore (as against the revised contractual amount of ₹11.51 crore) till September 2023 and the installed equipment were neither inspected/tested for performance nor handed over by the contractor to the department. The Master Control Room for the project was set up in the premises of KSNDMC and a joint physical verification (December 2023) by audit disclosed that though the server, computers and display units pertaining to the project were assembled in a room, the same was not tested/commissioned and thus, the project remained non-functional.

Overall, the project was not implemented in the State to the fullest spirit and objectives. Deficient implementation of the NCRMP, particularly the core component of early warning dissemination mechanism, affected the envisioned objectives of the project rendering the expenditure on infrastructure largely unfruitful.

The Government replied (August 2024) that the NCRMP was implemented in the State in three coastal districts. The reduced scope of the project was approved by central authorities and SEC. It is further stated that the contractor had completed installation of broadcasting equipment and supplied the master control facilities which are kept on the premises of KSNDMC. Final payment would be released only after ensuring proper commissioning/testing of the installed equipment.

[51] Comprising 30 items such as inflatable tower lights for nighttime disaster management, power saws, search and rescue equipment, First-Aid kit, free kitchen utensils, Life Buoy/Life Jackets, Hand Held Mega Phone, Fire Extinguishers, *etc.*

The reply of the Government is silent about the reasons for inordinate delay as well as drastic reduction in scope of work/coverage of population. Evidently, the project had not been rolled out in the State (August 2024) even after a delay of more than five years since commencement, which rendered the entire expenditure unfruitful.

❖ **Reconstruction/protection works**

Test-check of records relating to protection and reconstruction activities taken up by the Dakshina Kannada administration showed that the coastal line was severely exposed/affected to cyclones and sea erosion and the district administration had proposed (June-July 2023) protection/reconstruction works costing ₹19.84 crore and requested the State Government to release funds.

However, funds were not released for taking up these works, even as of January 2024. This signals the inattention of the Government towards disaster risk reduction frameworks.

7.2 Lightning

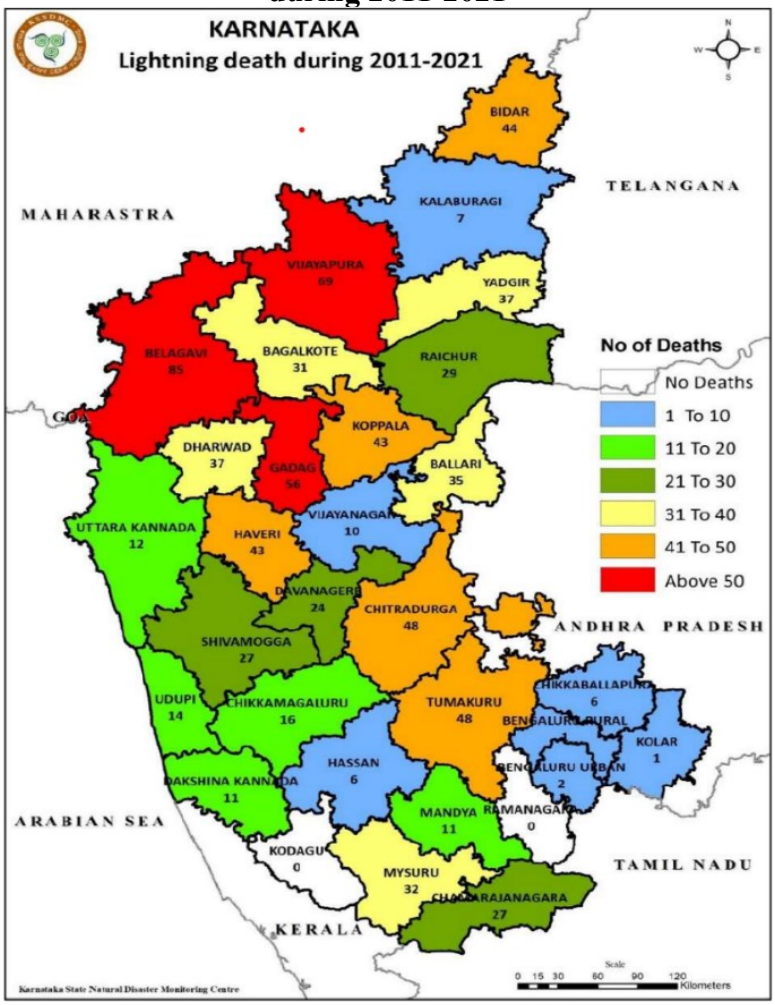
Lightning is a sudden electrostatic discharge that occurs during a Thunderstorm. This discharge occurs between electrically charged regions of a cloud called intra-cloud lightning, between Cloud to Cloud or between a cloud and the ground.

7.2.1 Lightning profile of Karnataka State

Karnataka is known for its diverse landscapes and climatic variations. Like other disasters, Lightning and thunderstorms were regularly witnessed due to which there was a continuous disastrous effect on life and property in recent years. 812 persons had lost their lives in the State in lightning incidence over a decade, which was more in the northern part of the State.

Map showing the district-wise and Chart with year-wise details of human deaths due to lightning are shown in **Chart 7.1**:

Chart 7.1: Deaths recorded in Karnataka due to lightning during 2011-2021



Source: KSNDMC.

7.2.1.1 Reliability of the data

The details of a number of human/cattle deaths and loss of other types reported due to lightning hazard *vis-à-vis* expenditure incurred towards payment of compensation under the test-checked districts are shown in **Table 7.2**.

Table 7.2: Details of deaths *vis-à-vis* compensation paid in test-checked districts

Year	Human deaths *(in numbers)*	Compensation paid *(₹ in crore)*	Livestock deaths *(in numbers)*	Compensation paid *(₹ in crore)*	Total compensation paid *(₹ in crore)*
2017-18	29	1.32	73	0.10	1.42
2018-19	32	1.59	93	0.10	1.69
2019-20	37	1.85	351	0.57	2.42
2020-21	37	1.85	49	0.06	1.91
2021-22	33	1.65	121	0.29	1.94
2022-23	21	1.05	90	0.16	1.21
Total	**189**	**9.31**	**777**	**1.28**	**10.59**

Source: As compiled by audit based on the data furnished by the test-checked districts (Status as of September 2023).

While Ramanagar district authorities did not maintain/furnish the details of human deaths due to lightning, the details of cattle deaths, if any, were not furnished by six[52] out of the nine test-checked districts.

Audit observed discrepancies between the statistics pertaining to the loss of human lives by lightning furnished by the district authorities and district level data shown in the Thunderstorm and Lightning Action Plan - 2022 published by the Revenue Department (Disaster Management).

Illustration

As per the data furnished by Kalaburagi district authorities to audit, the total death toll was 61 during the period 2017-2022. However, the Thunderstorm and Lightning Action Plan-2022 indicated the number of deaths as 7 during 2021 and zero during the other years.Similarly, the Kalaburagi District Disaster Management Plan 2022-23 reported that a total of 15 persons died from lightning strikes and torrential rains during the years 2018-19 and 2019-20 as against 20 deaths, as per data provided by Kalaburagi district authorities.

Thus, as seen from the above illustrative case, the data on which the State Government/KSDMA was proposing the actionable points was not reliable. Evidently, the KSDMA/nodal department was not obtaining the actual data from the districts concerned and validating the same before publishing authentic documents which will be the repositories for decision-making and future planning.

Further, though it was categorically mentioned in all lightning-related policy documents of the Government that hazard causes severe damage to property, the details regarding the loss of property and livestock in the State over the years had not been collected and compiled for the State as a whole, despite compensating for the same.

The Government replied (August 2024) that an IT system would be put in place to collate comprehensive details on human and animal loss due to lightning and other disasters.

7.2.1.2 Forecast and dissemination

The Indian Meteorological Department (IMD) under the Ministry of Earth Sciences, is the nodal agency for providing weather information and forecast, including warnings for all weather-related hazards. In addition, as a detection and forecast mechanism for lightning, the State Government had operationalized (June 2018/March 2020) a system to provide early warnings to the Government authorities and public across the State about the Thunderstorm & Lightning strikes, as discussed below.

❖ ***Insecure contract for procurement of data towards early warning for lightning***

KSNDMC had entered (October 2017) into a service contract with a firm[53], for obtaining basic data for providing early warning to public on lightning activities and development of a mobile app called "SIDILU". However, the contract was rescinded (November 2019) after making a payment of ₹73.75 lakh due to a dispute

[52] Chikkaballapur, Haveri, Kalaburagi, Kodagu, Ramanagara and Shivamogga.
[53] M/s. Cost Prize Online India Pvt Ltd, Bengaluru.

(on payment issues) between the agency and the vendor, which rendered the entire expenditure wasteful.

Again, in the month of March 2020, KSNDMC entered into a contract with another firm[54] for a total cost of ₹2.95 crore covering a period of five years and the SIDILU app was launched in the month of May 2020. As of December 2023, a total payment of ₹1.91 crore was paid to the firm.

However, audit observed that both the firms with which KSNDMC contracted were not in possession of any lightning monitors of their own but were obtaining data from another firm[55]. Thus, the contracted firms were only intermediary service providers.

Reasons for KSNDMC not contracting directly with firms/agencies owning the lightning monitors were not forthcoming from the records.

In the absence of a copy of the agreement between the original source agency and vendor (along with the terms and conditions) and a lawful commitment on the part of the source agency for provision of services during the entire contract period without breach, the contract for lightning alerts with the intermediary firm was rendered insecure and was fraught with the risk of expenditure going wasteful recurrently.

❖ **Inappropriate early warning alerts**

The Thunderstorm and Lightning Action Plan - 2022, mentions that 96 per cent of the total lightning-related deaths in the country are amongst the people working in the fields, mainly farmers in rural areas. Audit observed that the IMD at the State level issues the lightning warnings in the form of 'Nowcast'. Typical Nowcast lightning warnings issued by IMD are as shown in **Appendix 7.1**.

Audit observed that the early warnings are not location specific but cover a wide area covering many districts. Hence, dissemination of the warnings to people of specific locations likely to be affected by disaster is not only difficult but also practically hard to implement.

The State Government also developed a Mobile App called "SIDILU" for disseminating location-specific information about lightning strikes in the State based on the real time lightning data to the registered mobile numbers.

Details of alerts issued (through the app and tele-messages) under test-checked districts during audit period are shown in **Table 7.3.**

Table 7.3: Lightning alerts issued for test-checked districts during the years from 2018 to 2023

(in numbers)

District	2018	2019	2020	2021	2022	2023
Belagavi	4,442	7,550	2,549	7,688	5,036	3,421
Chikkaballapura	173	4,796	507	2,593	1,687	820
Dakshina Kannada	6,862	10,813	2,830	9,202	3,324	3,933
Davanagere	890	4,868	2,275	3,358	1,589	1,100
Haveri	2,318	4,908	1,821	4,178	2,242	1,332

[54] M/s. MOSERP Technologies India Private Limited, Bengaluru.
[55] M/s. Earth Networks.

District	2018	2019	2020	2021	2022	2023
Kalaburagi	2,086	4,929	1,131	7,765	4,796	3,471
Kodagu	768	3,554	1,009	2,327	982	941
Ramanagara	402	4,497	836	1,972	1,805	864
Shivamogga	239	6,069	2,875	5,842	2,505	1,731

Source: Data furnished by KSNDMC.

Despite these efforts, it could be observed that the deaths due to lightning had not shown any decreasing trend over the years (refer Table 7.2) evidencing the need of a robust mechanism at grass root level for community awareness for taking precautions from lightning strikes, in conjunction with advanced technological methods. For instance, 91 human deaths had been reported during 2020-2023 even after launching of SIDILU app and IMD nowcast.

The Government replied (August 2024) that lightning alerts were issued through Common Alerting Protocol, which is a location based alert dissemination system. However, it could be observed from Exhibit 7.1, that alerts issued are specifying vulnerability at district level covering vast area rather than particular locations.

7.2.2 Preventive/Mitigative measures

While loss or damage due to lightning cannot be avoided, it can be reduced through a robust early warning and information dissemination mechanism till the last mile along with a strong capacity-building arrangement. Hence, there was the requirement for a proper mandate and defined guidelines and action plan.

While the NDMA had not issued any exclusive guidelines for the management of lightning, it published the "Guidelines on Prevention and Management of Thunderstorm and Lightning/Squall/Dust/Hailstorm and Strong Winds" in March 2019. The State Government thereafter took three years to bring out the 'Thunderstorm and Lightning Action Plan - 2022'.

Neither the State Government nor the test-checked districts have initiated effective measures towards IEC activities, community awareness camps, *etc.*

7.2.3 Absence of follow up on the action points

The Thunderstorm and Lightning Action Plan - 2022, *inter alia*, suggested the following actionable strategies for effective management of lightning hazard:

- Installation of Doppler Weather Radars for better monitoring of situations;
- Periodical review and evaluation of the efficiency and reliability of the early warning system.
- Systemic study of past lightning occurrences by any expert agency or group.
- Collaboration with NGOs/CSOs and sharing of data between different agencies for preparation of advanced preparedness, mitigation, and response plans.
- Conducting mass awareness campaigns based on communication strategy and research insights.

However, records made available showed that the State Government had not initiated any action in this regard even as of August 2024. The Action plan also did not suggest required capacity-building measures to minimise the loss of human/animal lives and property due to this disaster.

The Government replied (August 2024) that IMD was in the process of installing two Doppler Weather Radars and stated that digital IEC was developed in regional language and disseminated to districts, however no documentary evidence was furnished to audit in this regard.

Recommendation 17: The State Government should ensure proper commissioning and effective functioning of disaster risk reduction projects, such as NCRMP, while enhancing capacity-building measures in respect of hazards like cyclones and lightning to minimize infrastructural damage and human loss.

Bengaluru
The 28 NOV 2025

(Jahangir Inamdar)
Accountant General (Audit-I)
Karnataka

Countersigned

New Delhi
The 3 DEC 2025

(K. Sanjay Murthy)
Comptroller and Auditor General of India