Report of the Comptroller and Auditor General of India on Disaster Management in Karnataka

Government of Karnataka

Report No. 08 of 2025

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Preface

- This Report for the year ended March 2023 has been prepared for submission to the Governor of Karnataka under Article 151 (2) of the Constitution of India.
- This Report of the Comptroller and Auditor General of India contains the results of "Performance Audit on Disaster Management in Karnataka" covering the financial period 2017-23.
- The instances mentioned in this Report are those, which came to notice during test audit for the period 2017-23 but could not be reported in the previous Audit Reports; matters relating to the period after 2017-23 have also been included, wherever necessary.
- The Audit has been conducted in conformity with the Auditing Standards issued by the Comptroller and Auditor General of India.
- Audit wishes to acknowledge the cooperation received from the Revenue Department (Disaster Management) and other stakeholding departments at each stage of this Audit process.

EXECUTIVE SUMMARY

Why did CAG do this Audit?

The State of Karnataka, due to its unique geo-climatic and socio-economic conditions, is vulnerable to various natural disasters and has been confronting frequent droughts, floods, landslides, *etc.* Disaster risks in the State are further compounded by changes in demography, unplanned urbanization and development within high-risk zones, environmental degradation, climate change and geological hazards. These factors contribute to a situation where disasters seriously threaten the State's economy, its population and sustainable development.

The increase in natural disasters over the past decade and the extent of damage caused to both public infrastructure and private properties was creating a substantial financial burden on the State Exchequer, which has necessitated understanding the reasons for such increase and the steps taken to forecast, prevent, mitigate and reduce the impact of the disasters. Disaster Management also calls for effective coordination between the different departments in the State. It is against this backdrop that the Performance Audit (PA) on Disaster Management has been carried out to assess the readiness of the State in its transformation from a response/relief-based approach to reducing disaster risk.

Though the PA was conducted covering the period from 2017-18 to 2022-23, it attempted to even analyse prior disastrous incidences *vis-à-vis* endeavours of the State Government not only in managing the calamity but also measures taken towards disaster risk reduction. The PA involved test-check of records of offices of the Principal Secretary, Revenue Department (Disaster Management) at the apex level and selected nine offices of Deputy Commissioners at district level besides Karnataka State Natural Disaster Management Centre (KSNDMC), Bengaluru. Belagavi, Chikkaballapura, Dakshina Kannada, Davanagere, Haveri, Kalaburagi, Kodagu, Ramanagara and Shivamogga districts were selected for audit as all of them had been subjected to floods and drought during the past decade. Moreover, the districts of Dakshina Kannada, Kodagu and Shivamogga had also encountered landslides while Dakshina Kannada often faced cyclones.

The State witnessed major disasters during the years 2018 to 2023 with floods occurring every year from 2018 to 2022, which caused damage to crops, infrastructure, losses to human lives and cattle. In 2023, all the 31 districts were declared drought affected causing an estimated crop loss of ₹ 65,594 crore.

Major Audit Findings

Karnataka State Disaster Management Authority (KSDMA) was constituted in the year 2008. However, the State Government published the State Disaster Management Policy only during the year 2020 *i.e.,* 12 years after constitution of KSDMA. KSDMA constituted the Advisory Committee consisting of experts in the field of disaster management, in December 2019. The State Disaster Management Plan for each year was being approved during/after September of the year to which the SDMP pertained.

Sixteen departments (dealing with functions vulnerable to disasters and as decided by SEC) prepared their DMPs only during 2020-21 but had not reviewed and updated them. None of the hospitals (except a few private hospitals under Bengaluru Urban district) and educational institutions in the State as well as test-checked districts had prepared the required disaster management plan. The State Emergency Operation Centre (SEOC) was under-equipped in terms of human resources and infrastructure, which affected its functioning. As regards the forecast mechanism for different disasters, Audit noticed that the data collection, forecasting and dissemination mechanism in place in the State was flawed with defunct/faulty equipment, deficient data, improper contract management, non-creation of disaster models, non-installation of sensors, *etc.* The Disaster Response Force units had huge vacancies (mainly in the cadres of police and fire service personnel) ranging from 67 to 96 *per cent* of the sanctioned strength whereby the units faced difficulties in managing shift-wise duties and rescue operations. As regards the National Disaster Management Information System (NDMIS), a comprehensive online application, developed by the Ministry of Home Affairs, the database was not being updated on a regular basis either at the State level or district level, failing which information regarding damages/losses on account of disasters could not be accurately captured.

Funds released (as per orders issued from the State level) were not 'calamity specific/component specific', making it difficult to monitor the actual utilisation of NDRF/SDRF grants. Multiple bank accounts were opened and operated at Taluks without the approval of the Government/competent authority, which violated the instructions (January 2017) of the Government itself. The Fire and Emergency Department had utilised ₹23.68 crore and ₹7.69 crore (released towards the components of search and rescue, capacity building and training) remained un-utilised and was lying in the bank account as at the end of March 2023. There was misappropriation of funds of ₹18.59 lakh during 2017-18, at Chintamani taluk of Chikkaballapura district. Further, ₹1.81 crore was paid by taluks of Haveri district out of SDRF fund, for reasons not related to natural calamities/disasters.

The State Government was yet to bring out region-specific guidelines for management of drought. KSNDMC installed Telemetric Rain Gauges (TRGs) and TWSs in a phased manner (2009-2015), however as of December 2023, the percentage of defective instruments was 43 *per cent* and 52 *per cent* respectively, with the reason attributable being non-revision of the AMC since March 2022. The State Government/KSDMA/SEC had not formulated the Crisis Management Plan up to 2022-23. The Crop Weather Watch Group (CWWG) set up in the State to monitor the drought situation in the State, did not meet as envisaged during the years 2017 to 2022. As of 2022-23, the envisaged mission/task force for drought mitigation had not been set up in the State.

Karnataka Groundwater Authority could not control illegal and inordinate extraction of groundwater for commercial purposes through private water tankers and did not possess either time-series data on the number of borewells in the State or data on the total number of borewells drilled in the water distressed notified taluks.

Despite being a drought-prone state, Karnataka also faced severe floods and landslides during the past decade. The State Action Plan for Flood Risk Management was brought out only during 2021 and in contrast to NDMA guidelines, did not provide for preparation of Flood Management Plans by schools, hospitals, industries, entertainment houses *etc*. In the absence of basic data, the State Government/KSNDMC could not create the envisaged hydrological models for flood forecasting in the State/region, rendering the investment of ₹2.45 crore on the sensors and stream gauge monitors largely unfruitful. The purpose of installing equipment at grassroots level for alerting endangered population from flood early warning through a wireless broadcasting system was not achieved. 25 Telemetric Water Stations (TWSs) and 04 ultrasonic water level sensors to be installed under the work 'Preparation of urban flood model for Bengaluru' funded by the Department of Science and Technology, GoI, were installed and the project remained unimplemented. As of December 2023, 49 out of 100 Water Level Sensors (WLS) installed on storm water drains in Bengaluru were non-functional and no information/data was available in respect of five WLS installed at flood vulnerable streets. Further, 69 out of the 184 equipments *viz.,* Telemetric Rain Gauge, Telemetric Weather Stations, Telemetric Water Level sensors installed under smart cities of Mangaluru, Belagavi and Hubballi-Dharwad remained non-functional (December 2023).

Despite mentioning the requirement of legal framework in its Flood Action Plan, the State did not establish a legal framework for obtaining mandatory clearances by agencies for construction of public infrastructure in flood-prone areas, as a result of which there were instances of National/State highways, Railways and other roads getting flooded/inundated.

Lacuna was noticed in the provision of relief assistance particularly in compensation of house damages and crop loss. Verification of a few individual payment files showed that photographs which neither had GPS coordinates nor the signs of rain/wetness on the damaged portion/collapsed buildings formed the basis for payment. The absence of clear guidelines on the classification of damage and the huge difference in payment of compensation between categories allowed for arbitrary classification by the authorities, leading to contrasting compensation for the same percentage range of damage. As against 1,10,407 approved cases of house damage for reconstruction during 2019-23, construction had not commenced in 22,496 cases (20 *per cent*) for which a total of ₹213.94 crore was already paid, raising questions on the assessments made. A sample analysis of *Parihara* portal (based on individual Aadhar number) disclosed omissions in payment of compensation for crop loss. Random verification of the data (through input of data like individual Aadhaar number, year, season, calamity, *etc*.) in the *Parihara* portal showed instances of compensation having been paid in violation of the guidelines. A joint physical inspection (October 2022) of three bridges and two roads (State highway) damaged due to flood during the year 2022-23 in Ramanagara district revealed that bridges/roads had not been restored and resultantly, the public were forced to take alternate longer routes.

Under landslide management, the State's response had been inadequate, with a delayed State Action Plan. Critical gaps include inaccurate landslide hazard zonation maps, lack of a landslide inventory and lack of early warning systems. The State Government had rolled back the ban imposed on land conversions from

agriculture to non-agricultural purposes in Kodagu district. The DC office (District Disaster Management Authority) building at Kodagu was built on a landslip vulnerable site and remained insecure despite an expenditure of ₹6.25 crore.

The National Cyclone Risk Mitigation Project faced delays in implementation with EWDS equipment yet to be tested and shelter level equipment not being supplied to any MPCS. There were discrepancies between 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). Deaths due to lightning had not shown any decreasing trend over the years 2018-23, 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. As of August 2024, action had not yet been initiated on the suggested actionable strategies to counter damage caused by Thunderstorms and Lightning.

Recommendations:

- *The State Government should ensure effective functioning of institutions like SDMA, SEC, DDMAs etc., duly complying with provisions of the DM Act and ensure preparation of integrated disaster management plans at all envisaged levels.*
- *The State Government should revamp the Emergency Operation Centres at all levels while ensuring availability of key infrastructure and form sector specific teams to deal with different disasters.*
- *The State Government should ensure adequate capacity building by training officials at all levels for effective management of disasters at ground level and also strengthen the State Disaster Response Force.*
- *The State Government should prioritise IEC activities at all levels to create awareness and better educate communities on disaster management.*
- *The State Government should ensure strict adherence to financial record-keeping and reconciliation procedures to enhance accountability and transparency in financial transactions.*
- *The State Government should formulate guidelines for mitigating drought considering geo-spatial climate variations and ensure effective coordination among all the sectors in enhancing drought mitigation efforts.*
- *The State Government should emphasise measures for water conservation and water harvesting as well as enforce regulations on unchecked groundwater extraction.*
- *The State Government should take immediate measures to prepare floodplain zoning of all vulnerable locations and should enact regulations thereon. It also should contemplate shifting villages persistently affected by floods to safer elevations to avoid recurrent damage as well as expenditure towards compensation.*
- *The State Government should streamline the procedure for payment of compensation towards damages preventing ineligible payments and fixing accountability on concerned officials for any irregularities.*

- *The State Government should put in place a proper institutional framework integrating geo-referenced landslide inventory-cum-susceptibility maps, regulate landslide risk areas and develop a Comprehensive Landslide Prevention and Mitigation Plan to avoid geological disaster. Government should also ensure thorough assessments of land conversions and enforce zoning regulations.*
- *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.*

Chapter - I

Disaster management and Audit framework

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Disaster management and Audit framework

Disaster is defined[1] as a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man-made causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of property, or damage to/or degradation of environment and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area. While natural disasters result from geographical phenomena and include floods due to heavy rainfall, drought, earthquake *etc*., the human-made disasters result from human errors which include fires, industrial explosions, structural failures, *etc*. While landslides can be both natural and human induced, floods can also be attributable to human interventions like unauthorized land use conversions, encroachments to water bodies, clogging of stormwater drains, *etc*.

Disaster risk arises when hazards interact with physical, social, economic and environmental vulnerabilities. Despite the growing understanding and acceptance of the importance of disaster risk reduction and increased disaster response capacities, disasters continue to pose a global challenge.

1.1 Disaster Management

Disaster Management (DM) means a continuous and integrated process of planning, organising, coordinating and implementing measures which are necessary or expedient for:

- preparedness to deal with any disaster and capacity-building thereon.
- mitigation or reduction of risk of any disaster or its severity or consequences.
- prompt response to any threatening disaster situation or disaster and assessing the severity or magnitude of effects of any disaster.
- evacuation, rescue and relief followed by rehabilitation and reconstruction.

The Disaster Management cycle is depicted in the **Chart 1.1** below.

Chart 1.1: Disaster Management cycle

Source: Karnataka State Disaster Management Plan 2021-22

[1] The Disaster Management Act, 2005.

An effective disaster risk management contributes to sustainable development.

1.2 Disaster Risk Reduction - Strategies and Frameworks

Disaster risk is increasingly of global concern and its impact and actions in one region can have an impact on risks in another, and *vice versa*.

The Sustainable Development Goals (SDGs) are a universal call for action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. Based on NITI Aayog's mapping framework, the Government of Karnataka had aligned its policies and programmes with SDGs and targets. The SDGs related to disaster management primarily fall under SDG 11: "Sustainable Cities and Communities" and SDG 13: "Climate Action". While disaster management is not a standalone SDG, it is closely interconnected with these goals and several others, as disasters can have significant social, economic, and environmental impacts. There are 25 targets related to Disaster Risk Reduction (DRR) in 10 of the 17 SDGs, firmly establishing the role of DRR as a core development strategy.

As part of the National Framework, the High-Power Committee on Disaster Management, constituted by the Government of India (GoI) in 1999 had notified 31 various disasters categorised into five major groups *viz.,* Water and Climate related, Geological related, Biological related disasters, Chemical/Industrial/ Nuclear related and accident-related disasters.

The GoI enacted (December 2005) the Disaster Management Act, 2005 (DM Act) which provided for establishment of National Disaster Management Authority (NDMA) and State Disaster Management Authorities. This was expected to usher in a paradigm shift in disaster management from an earlier relief-centric approach to a proactive regime that lays greater emphasis on preparedness, prevention and mitigation.

The NDMA brought out (2009) the National Policy on Disaster Management with a vision to build a safe and disaster resilient India by developing a holistic, proactive, multi-disaster and technology-driven strategy through a culture of prevention, mitigation, preparedness and response.

Accordingly, the Government of Karnataka published (2020) the State Policy on Disaster Management.

1.3 Disaster profile of the State

The State of Karnataka is one of the disaster-prone States in India owing to its geo-environmental diversity and vulnerability. It is situated on a plateau where the western and eastern ghat ranges converge in the western part of the Deccan peninsular region of India. While the State is highly prone to hazards such as drought, flood, landslides, *etc*., it is also affected by other hazards such as cyclones, lightning, and earthquakes.

The major disaster profile of the State in the past decade is shown in **Table 1.1**.

Table 1.1: Major disaster profile of the State

Disaster	Affected	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
		(in numbers)											
Drought	Districts	28	28	9	27	30	-	30	18	-	-	-	31
	Taluks	157	125	34	136	164	-	164	49	-	-	-	223
Flood/Rainfall	Districts	-	8	8	-	6	-	7	22	25	28	30	-
	Taluks	-	35	42	-	24	-	25	103	180	182	*	-
Landslide	Districts	2	2	3	2	3	4	7	5	5	5	-	-
	Taluks	2	2	3	2	4	6	12	7	9	10	-	-
Earthquake	Districts	2	1	1	1	1	2	1	1	1	6	-	-
	Taluks	2	1		1	1	2	1	1	1	10	-	-

Source: State Disaster Management Plan 2022-23 and Memoranda
**In 2022, number of taluks affected by floods was not notified*

As at the end of March 2023, there were 31 districts with 223 taluks. The major disastrous incidents that happened in the State during the Audit period of 2017-18 to 2022-23 and their impacts are listed in **Table 1.2** and **Table 1.3** below.

Table 1.2: Major disaster events which happened in Karnataka during calendar years 2018-23

Calendar Year	Disaster	Impact
2018	Severe drought affecting 30 districts	Total estimated loss – ₹28,046.95 crore Rabi season: Crop loss - ₹11,384.47 crore Kharif season: Crop loss - ₹16,662.48 crore
	Heavy rainfall leading to floods in seven districts coupled with devastating landslides	Total estimated loss – ₹3,705.87 crore Crop loss– ₹1,670.84 crore Compensation and relief items – ₹227.51 crore Damage to infrastructure – ₹1,811.54 crore 67 human and 240 cattle deaths
2019	Floods in 22 districts	Total estimated loss - ₹35,160.81 crore Crop loss of ₹15230.60 crore Damage to infrastructure – ₹9,642.67 crore Compensation and relief items – ₹ 10,287.44 crore 91 human and 3,400 cattle deaths
	49 taluks declared drought affected	---
2020	Floods in 25 districts	Total estimated loss - ₹23,481.63 crore Crop loss of ₹17,700.76 crore Damage to infrastructure – ₹10,984.71 crore Compensation and relief items – ₹458.58 crore 85 human and 1,867 cattle deaths
2021	Coastal districts affected by cyclone *Tauktae*	Total estimated loss - ₹209.60 crore Crop loss of ₹4.48 crore Damage to infrastructure – ₹196.93 crore Compensation and relief items – ₹8.19 crore 6 human and 2 cattle deaths
	Floods in 28 districts	Total estimated loss - ₹5,690.51 crore Crop loss of ₹1,702.65 crore Damage to infrastructure – ₹3,619.21 crore Compensation and relief items – ₹368.65 crore 16 human and 358 cattle deaths

Calendar Year	Disaster	Impact
2022	Floods in 30 districts	Total estimated loss - ₹7,647.13 crore Crop loss of ₹3,596.26 crore Damage to infrastructure – ₹3,673.30 crore Compensation and relief items – ₹404.57 crore 82 human and 462 cattle deaths reported
2023	All 31 districts of the State declared drought affected	Total loss estimated - ₹65,594.92 crore (crop loss)

Source: Memoranda submitted by State Government to GoI

Table 1.3: Estimated Loss due to Calamities

Calamity (*Calendar year*)	**Total estimated loss** *(₹ in crore)*	**Loss of lives**	
		Human	**Livestock**
Drought (2018, 2019 and 2023)	93,641.87	-	-
Flood and landslide (2018, 2019, 2020, 2021 and 2022)	75,685.95	341	6,327
Cyclone (2021)	209.60	6	2
Total	**1,69,537.42**	**347**	**6,329**

Source: Memoranda submitted by State Government to GoI

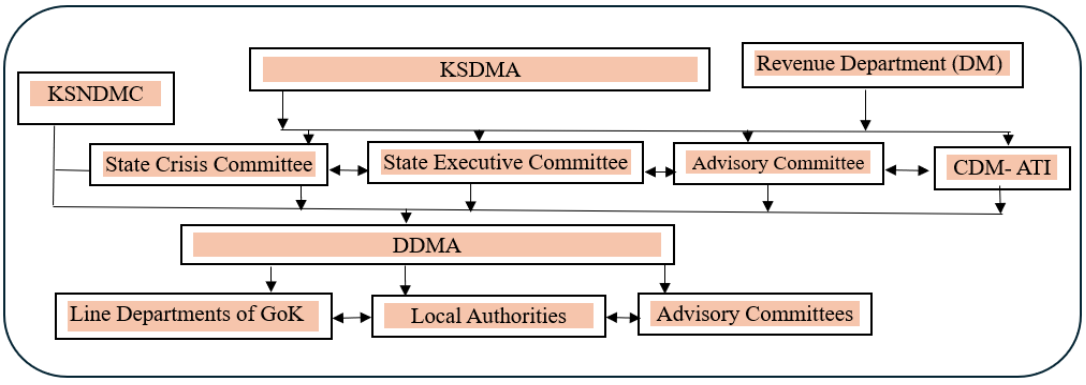
Though the State Government did not notify any specific disaster during the year 2022, expenditure was, however, found to have been incurred towards compensation for rain damage.

As could be seen from the tables above, the State was affected severely by one or the other hazards with substantial damage to agriculture/horticulture crops, public infrastructure and individual houses besides, loss of human lives and livestock. There were instances of both drought and flood distressing the State in the same year.

1.4 Organisation set up

The Revenue Department (Disaster Management) headed by a Principal Secretary to the Government is the nodal department for monitoring disaster management in the State. The organisational setup in respect of disaster management at State level is given in **Chart 1.2**.

Chart 1.2: Organisational Setup at State level for Disaster Management



Source: Karnataka State Disaster Management Plan 2017-18

The institutional arrangements for disaster management in the State and their functioning are detailed in Chapter 2 of this report.

1.5 Why did we select this subject?

The State has suffered recurrent hazards of different types causing substantial damage to both public infrastructure and private properties. Disaster Management also calls for effective coordination between the different departments in the State. It is against this backdrop that the Performance Audit (PA) on Disaster Management has been carried out to assess the readiness of the State in its transformation from a response/relief centric approach to disaster risk reduction.

1.6 Audit Objectives

The PA was undertaken to assess whether:

- Institutional mechanism is in place as per the DM Act and functioning effectively in implementing disaster management policies and plans.
- Adequate financial resources are provided for disaster management and efficiently utilised.
- Forecasting mechanism and preparedness for disasters are timely and effective.
- The State has taken appropriate preventive and mitigation measures in addition to the response-relief approach and rehabilitation activities.

1.7 Audit criteria

Audit observations are benchmarked against the criteria derived from:

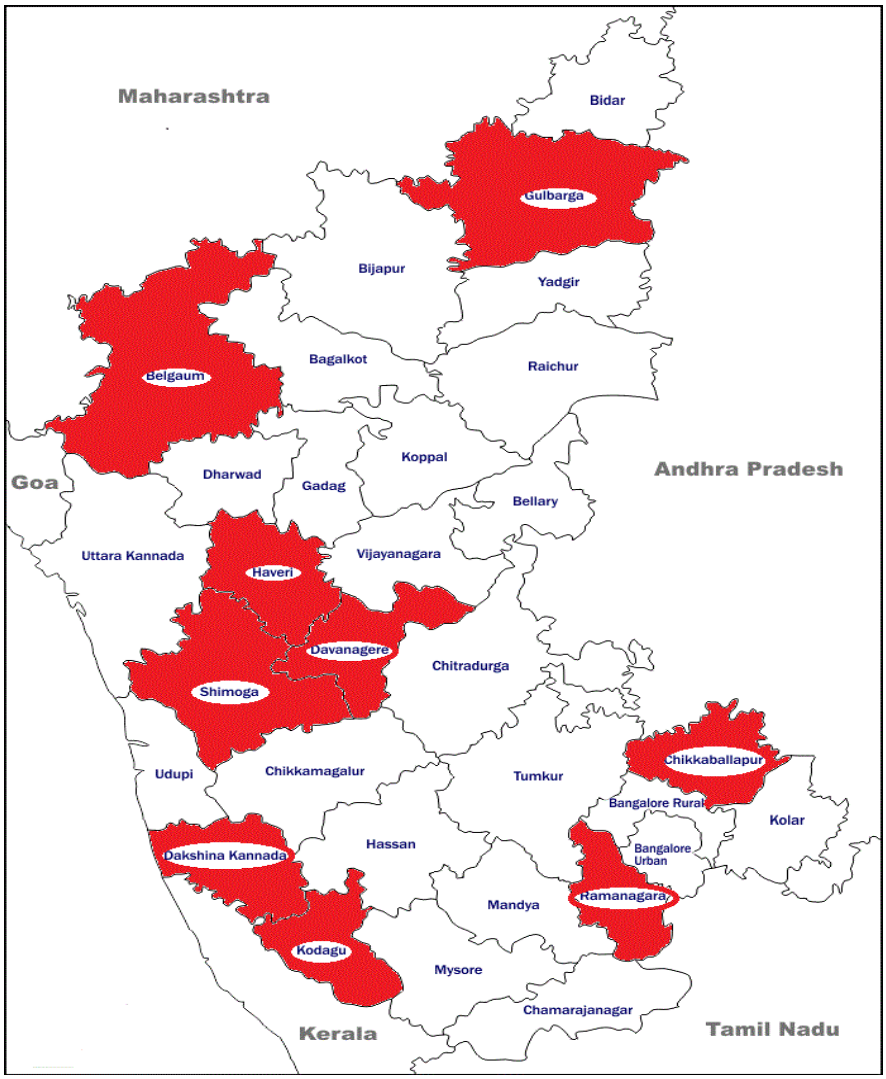
- Disaster Management Act 2005;
- NDMA Guidelines on respective disasters;
- Disaster Management Policies and Plans; and
- Government instructions, orders, circulars, *etc*.

1.8 Scope and methodology of Audit

In the absence of comprehensive details of incident/disaster-wise expenditure, Audit selected the districts adopting random sampling method through IDEA. The PA covering the period 2017-18 to 2022-23 was conducted from November 2022 to July 2023 through scrutiny of records at the Office of the Principal Secretary to the Government, Revenue Department (Disaster Management) and Offices of the Deputy Commissioner of selected nine[2] districts (**Chart 1.3**).

[2] Belagavi, Chikkaballapur, Dakshina Kannada, Davanagere, Haveri, Kalaburagi, Kodagu, Ramanagara and Shivamogga.

Chart 1.3: Districts selected for Performance Audit



Joint physical verification of disaster-affected locations was also conducted, wherever necessary and possible.

All of the test-checked districts have been subjected to floods and droughts during the past decade. While the districts of Dakshina Kannada, Kodagu and Shivamogga had also encountered landslides, the coastal district of Dakshina Kannada often faced cyclones. Besides, there were instances of loss of human lives and livestock due to lightning in these districts.

An entry conference was held on 9 January 2023 with the Principal Secretary, Revenue Department (Disaster Management) wherein Audit objectives, scope and methodology of Audit were discussed. The findings of the Performance Audit were discussed in the exit conference held on 22 January 2024 with the Principal Secretary, Revenue Department (Disaster Management). The State Government furnished replies to the draft report during August 2024 which have been incorporated appropriately in the Report. In cases where replies were not furnished, the minutes of the exit conference have been considered.

1.9 Acknowledgement

Audit acknowledges the cooperation extended by the Principal Secretary and staff at Revenue Department (Disaster Management) and the staff at the Offices of the Deputy Commissioner at test-checked districts during the conduct of this Performance Audit.

1.10 Structure of the report

The Disaster Management Act and the National Policy on Disaster Management spell out the institutional arrangements to be in place for management of all disasters, both at the Centre and the States. The Karnataka State Disaster Management Policy stipulated an institutional framework and responsibilities thereon together with the need for capacity building measures including forecast mechanism for disaster management in the State. Chapter II of the Report deals with the institutional framework present. Additionally, the mechanism for forecasting and capacity building measures have been looked into.

The management of disasters and implementation of policies/action plans require sufficient funding. Chapter III deals with financial resources and their utilisation.

The National Disaster Management Authority has brought out separate guidelines for management of various disasters such as floods, cyclones, landslides, drought, lightning *etc.*, beginning from the year 2007 onwards. The State, though belatedly, has brought out its action plans for management of each disaster other than drought. Chapters IV, V, VI and VII deal with management of drought, flood, landslide and other disasters respectively with a focus on compliance with the stipulated provisions.

The major components of disaster management cycle include response, rescue, relief and rehabilitation activities. Disaster management in the State has been more response and relief-centric rather than making the State disaster resilient. These aspects were discussed appropriately in the respective disaster-wise chapters.

Chapter - II

Institutional framework and Capacity building

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Institutional framework and Capacity building

This chapter deals with the deficiencies in the systemic establishments and functions that were to be implemented by the State. Effective implementation of measures for disaster risk reduction as laid down in the DM Act was marked by delays, infrequent meetings and inadequate emphasis on prevention and mitigation activities. This impacted the State's ability to transit from being reactive relief-centric to being proactive in its disaster risk reduction approach.

The delays in approving the State disaster management plans, non-integration of departmental disaster management plans, non-compliance by institutions like hospitals and educational institutions with respect to preparation of plans and the absence of plans by various other agencies raise concerns about the overall state of disaster preparedness in Karnataka. The State's disaster response force and emergency operation centres were found to be ill-equipped and underfunded, understaffed, thus severely hampering their effectiveness.

The expenditure towards capacity building and preparedness was inadequate. The State Government did not achieve objectives of the *Aapdamitra* scheme and had not taken up effective IEC initiatives. Deficiencies in the weather forecast mechanism affected the efficacy of the early warning system in the State. The State Government is yet to activate the Incidence Response System (IRS).

2.1 Institutional Arrangements and Disaster Management Plans in the State

Prior to implementation of the DM Act, the institutional mechanism in Karnataka for disaster risk reduction was of the nature of providing response and relief centric measures. The institutional structure for DM is hierarchical and functions at different levels *viz.*, Centre, State, District and Local. Further, it is a multi-stakeholder setup, *i.e.*, the structure draws involvement of various ministries, Government departments, administrative bodies and institutions.

In accordance with the DM Act, GoI established (December 2005) the National Disaster Management Authority (NDMA) headed by the Prime Minister and the National Executive Committee (NEC) under the Chairmanship of Secretary to the Government of India in charge of the Ministry or Department of the Central Government having administrative control of disaster management.

The DM Act also stipulated establishment of Disaster Management Authority and the Executive Committee in every State, as well as subordinate local authorities.

2.1.1 Karnataka State Disaster Management Authority (KSDMA)

In accordance with Section 14 of the DM Act, the Government of Karnataka established (May 2008) the Karnataka State Disaster Management Authority (KSDMA) headed by the Chief Minister of the State and consisting of nine

Ministers[3] and the Chief Secretary of the State as the Chief Executive Officer. The Secretary, Revenue Department (DM) will be the Member Secretary.

KSDMA was "to make Karnataka safer and disaster resilient through proactive disaster risk governance, adopting a people-centric approach to disaster risk reduction, climate change adaption and working towards sustainable developmental goals by harnessing appropriate technology and strategy involving all stakeholders, to improve the capability to mitigate, prepare, respond, and recover from all natural and manmade disasters".

The powers and functions of KSDMA included: (a) laying down the State Disaster Management Policy; (b) approving the State Disaster Management Plan[4] (SDMP); (c) approving the disaster management plans (DMPs) of the departments and their review; (d) laying down guidelines to be followed by the departments for integration of measures for prevention of disasters and mitigation in their development plans and projects and provide necessary technical assistance therefor; (e) coordinating the implementation of the State Plan; (f) recommending provision of funds for mitigation and preparedness measures *etc*.

Audit observed that KSDMA was constituted in the State after a delay of more than two years since implementation of the DM Act, and even as of March 2023, it was not provided with any required infrastructure like office space, human resources, furniture/stationery, *etc*., for its activities.

Further, as per Section 15 of the DM Act, KSDMA was to meet as and when necessary and at such time and place as the Chairperson of the State Authority may think fit. However, though the State was experiencing disaster each year, KSDMA met only thrice, in November 2019, September 2020 and September 2021 and no meetings were held during the years 2017-18, 2018-19, 2021-22 and 2022-23. A review of proceedings of the KSDMA meetings showed that, apart from approval to SDMP, the issues discussed were on constitution of Advisory Committee and preparation of DMPs by departments. It was observed that the issues relating to prevention and mitigation of disasters were not discussed in any of the meetings along with coordination/monitoring of implementation of disaster plans.

Also, KSDMA did not effectively carry out the responsibilities prescribed in the DM Act towards laying down guidelines for formulation of development plans and provision of technical assistance therefor and thus, the functioning of the KSDMA was not constructive.

The Government replied (August 2024) that action had been initiated to strengthen the KSDMA with adequate staff and ensure proper functioning and conduct of all statutory body meetings regularly. However, audit observed that neither infrastructure nor required human resources were provided to KSDMA even as of September 2024. The reply vindicates the Audit finding that

[3]Revenue, Home, Agriculture, Health & Family Welfare, Rural Development & Panchayat Raj, Public Works, Animal Husbandry, Housing and Energy.

[4]The Disaster Management Plan (DMP) is a policy document which needs to spell out the standard operating procedures to make the State disaster resilient, achieve disaster risk reduction through minimising loss of life/livelihoods/assets and maximizing the ability to cope with disasters at all levels of administration as well as among communities.

necessary staff and periodical meetings were not held, thus rendering KSDMA ineffective.

2.1.1.1 Delay in preparation of the State Disaster Management Policy

As per Section 18(1) of the DM Act, the State Authority shall have the responsibility for laying down policies and plans for DM in the State. Section 18(2)(a) of the DM Act stipulated the State Authority to lay down the State Disaster Management Policy.

The State Government published the State Disaster Management Policy only during the year 2020 *i.e.*,11 years after GoI published (2009) the National Policy. Consequently, the DM plans prepared earlier and the DM activities handled in the State till the year 2020 were without the backing of a policy document.

The State Government did not furnish records relating to preparation of SDM Policy or explain the reasons for the delay but only replied (August 2024) that the SDM Policy was drafted in alignment with National Disaster Management Policy. It was further replied that periodic updation of the Policy is being undertaken. However, details of the updations incorporated and action taken thereon were not furnished to Audit.

2.1.2 Cabinet Sub-Committee on Disaster Management

The State Government constituted the Cabinet Sub-Committee (CSC) on Disaster Management once every five years[5] starting from June 2013, consisting of selected Ministers with Revenue Minister being the Chairman. The CSC was to review the situation arising due to hazards like drought, floods and other natural disasters, formulate/decide policies and issue instructions for efficient management.

Audit observed from the records made available that the CSC had met only thrice[6] during the Audit period {2017-18 (1) and 2018-19 (2)}. The details of the meetings conducted during other years were not forthcoming from the available records. As such, it could not be ascertained whether issues pertaining to multiple disasters and causes thereof were adequately addressed in the meetings.

Verification of proceedings of the meetings made available showed that the CSC had discussed issues like drought/flood situation in parts of the State, maintenance of fodder banks, payment of crop loss compensation, provision of drinking water, employment opportunities under MGNREGS to avoid migration, *etc*. Test-check of records at district level showed that relief measures like drinking water supply, provision of fodder *etc*., have been taken besides, payment of compensation.

The Government replied (August 2024) that the CSC had met eight times during 2023-24 and all possible measures were taken to ensure effective management of all the notified disasters through respective departments and authorities. The reply clearly indicates that the nodal body like CSC did not meet adequately till

[5] June 2013, June 2018 and June 2023.
[6] May 2017, November and December 2018.

2023-24, the period during which the State had encountered disasters repetitively.

2.1.3 Advisory Committee

The KSDMA constituted the Advisory Committee consisting of experts in the field of disaster management, as required under Section 17 of the DM Act, only in December 2019 after a delay of 11 years since its constitution. As per the details furnished by the department, the Advisory Committee had met only twice (21-01-2020 and 22-05-2020) since its formation.

A review of the proceedings of these meetings revealed that issues discussed generally involved preparation of State policy, preparation of departmental disaster management plans, strengthening forecast system, issue of safety and traffic congestion at airports as vulnerability, supply of safe drinking water during disasters, providing training in telemedicine, *etc*., however were without specific reference to any disaster the State was confronting.

The Government replied (August 2024) that action had been initiated to reconstitute the Advisory Committee in the State. The purpose of an advisory committee involving experts is to assist the State Government and the failure to convene regular meetings would deprive the Government of consistently availing specialised technical guidance.

2.1.4 State Executive Committee

In accordance with Section 20(1) of the DM Act, the State Government constituted (March 2008) the State Executive Committee (SEC) under the Chairmanship of the Chief Secretary to the State Government. The SEC was to assist the KSDMA in the performance of its functions following the guidelines laid down by the KSDMA and to coordinate and monitor the implementation of the National policy, the National plan and State plan for management of disasters in the State.

2.1.4.1 State Disaster Risk Reduction Road Map

Karnataka has faced various types of disasters successively impacting normal life and community property as well as public infrastructure and hence, there was a need to prepare a DRR road map containing broad areas for intervention that will be taken up by various departments along with time-bound implementable action plans.

Audit observed that the SEC mooted the proposal for preparation of DRR road map and assigned the task to UNICEF, Hyderabad only during 2021-22 and even as of January 2024, the State Government had not published its DRR Road Map with committed timelines to ensure a disaster resilient Karnataka.

From records made available, Audit noticed absence of road map with defined responsibilities and committed timelines, whereby the line departments did not initiate adequate preparatory/mitigative measures which affected the State's preparedness to confront one or the other or multiple disasters each year (as

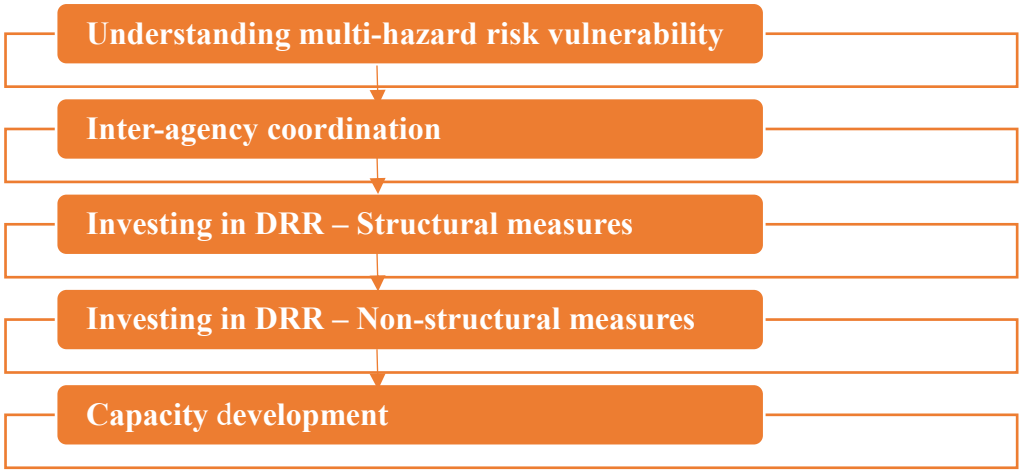
tabulated in Chapter I causing damage to lives[7]/infrastructure besides substantial financial burden towards compensation/restoration.

The Government replied (August 2024) that DRR road map had been prepared delineating department-wise responsibilities and goals and has been placed before the SEC for review.

2.1.4.2 State Disaster Management Plans

A Disaster Management Plan needs to be dynamic, actionable and updated/revised periodically in keeping with the situation on the ground. In the State, the SEC was responsible (Section 23 of DM Act) for preparing the SDMP. The SDMP was to include among other things the vulnerability of different parts of the State to different forms of disasters, measures to be adopted for prevention and mitigation of disasters, roles and responsibilities of each department *etc*. The components of SDMP are shown in **Chart 2.1** below:

Chart 2.1: Flow chart showing the components of SDMP



Source: KSDMP 2017-18.

➢ **Preparation of State Disaster Management Plans**

The NDMA published the updated and revised National Disaster Management Plan (NDMP) during November 2019. Accordingly, the State Government adopted the format for preparation of SDMP.

During the Audit period (2017-2023), the SEC had not prepared the SDMP for the years 2017-18 and 2018-19 and no reasons for the same were forthcoming from the records made available to audit.

The SDMP was to be prepared after consultation with local authorities, district authorities and the people's representatives. However, records of the SEC/Revenue Department (DM) made available did not contain the details of the SEC consultation with the local authorities, district authorities and the people's representatives prior to preparation of SDMP.

[7] Both Human and Livestock.

State Government replied (August 2024) that the SDMPs have been formulated in consultation with all the line departments for efficient management of natural disasters and details of consultative meetings would be documented in future.

The deficiencies in implementation of SDMP in the State are discussed in respective disaster-wise chapters.

- **Absence of Standard Operating Procedures/Action plan**

Verification of SDMPs disclosed that plans had been prepared stipulating only the responsibility framework for the line departments with respect to different disasters. However, the required Standard Operating Procedures (SOP) to be followed by the authorities either prior to or post disasters had not been included in the SDMPs. Besides, none of the SDMPs included specific action plans for any disaster which the State had encountered in the past.

Though the list of disasters during the past years had been mentioned in the SDMPs, the details of lessons learnt and actionable points thereon to prevent such mishaps in future were not brought out.

- **Delay in approval of State Disaster Management Plans**

Section 23(7) stipulates that the copies of the SDMP, approved by the SDMA, shall be made available to all the departments of the Government to enable them to draw up their own annual plans in accordance with the State Plan. It was, therefore, judicious to prepare the SDMP for the ensuing year well in advance. Audit observed that there were delays in approval of the SDMP, by the SDMA every year. The SDMP for each year was being approved during/after September of the year to which the SDMP pertained.

The Government replied (August 2024) that action was being initiated to update and e-publish the SDMPs, but did not clarify the reasons for delay in approval of plans every year.

- **Objectives of State Disaster Management Plans not achieved**

The SEC prepared the SDMPs with defined objectives which *inter alia* included stimulating prevention and preparedness measures, putting in place a forecast mechanism, ensuring an institutional techno-legal framework, *etc*. It was observed that there were certain deficiencies in achieving the objectives of SDM Plans as shown in **Appendix 2.1**. The lacunae in achieving the objectives of SDM Plans are discussed in detail in corresponding disaster-wise Chapters in the Report.

2.1.4.3 Non-evaluation of preparedness

As per the DM Act (Section 22(2)(f)), the SEC among other functions was required to evaluate the preparedness at all governmental or non-governmental levels to respond to any threatening disaster situation or disaster and give directions, where necessary, for enhancing such preparedness). Audit observed that SEC had not taken up any such evaluation which resulted in departments not initiating necessary preventive/mitigative measures, affecting the State's preparedness to encounter disasters year on year, particularly floods and

landslides which were severely damaging infrastructure and vegetative/agricultural crops.

The Government replied (March 2023) that evaluation was not taken up as SDMP is prepared every year to guide the departments to take up preparedness activities. The reply is not acceptable as apart from guiding the departments, as per the DM Act, the SEC was also required to evaluate the preparedness of various levels of government to handle disasters. The SDMP enables the line departments only to chalk out the disaster plan and it cannot supplement the functions of SEC.

2.1.5 District Disaster Management Authority

Every State Government shall, as soon as may be after constitution of the SDMA, establish a District Disaster Management Authority (DDMA) for every district (Section 25(1) of the DM Act) by notification in the Official Gazette. The DDMA was to act as the planning, coordinating and implementing body for disaster management at district level and take all necessary measures in accordance with the guidelines laid down by the NDMA and KSDMA. It will, *inter alia*, prepare the District Disaster Management Plan (DDMP) including district response plan.

The State Government established the DDMA for every district in the State headed by the Deputy Commissioner of the respective district, with the elected representative of the local authority as the Co-Chairperson in 2009. Audit, however, observed that the constitution of DDMAs was notified only during February 2021.

2.1.5.1 Meetings of the District authorities

Section 27 of the DM Act stipulates that the District Authority shall meet as and when necessary and at such time and place as the Chairperson may think fit. The details of meetings held by DDMAs of the sampled districts during the period from 2017-18 to 2022-23 are shown in **Table 2.1**.

Table 2.1: Number of meetings held by DDMAs of sampled districts

District	Number of meetings held during					
	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
Belagavi	1	0	5	1	1	4
Chikkaballapura	0	1	1	1	1	1
Dakshina Kannada	4	1	3	6	8	6
Davanagere	0	0	3	0	0	0
Haveri	0	0	2	8	2	0
Kalaburagi	Not furnished					
Kodagu	0	0	0	1	2	2
Ramanagara	1	1	2	2	3	3
Shivamogga	0	0	3	2	1	5

Source: Information furnished by the districts.

Dakshina Kannada and Ramanagara were the only districts which had conducted the DDMA meetings consistently during all the years. DDMA, Belagavi had not met even once during 2018-19 and had met only once during 2017-18, 2020-21 and 2021-22 despite the fact that the district was subjected to various disasters year on year. Further, the Kodagu district is vulnerable to flood/landslides and hence, DDMP has a critical role to play in preparedness

and mitigation. However, the DDMA, Kodagu had not met even once during 2018-19, the year in which the district was subjected to severe flood and landslide.

Audit further observed that the DDMAs of sampled districts did not constitute any advisory committees, though required under Section 28(1) except Dakshina Kannada which had committees for oil spill and quick response.

State Government replied (August 2024) that although the meetings of DDMA are conducted at the districts regularly, the same had not been documented suitably.

2.1.5.2 District Disaster Management Plans

Section 31 of the DM Act stipulates that there shall be a plan for disaster management for every district of the State to be prepared by the District Authority and approved by the State Authority. The district plans shall be reviewed and updated annually.

Audit observed that the DDMAs of the selected districts had prepared the district plans during the years 2017-18 to 2022-23. Though the district plans were forwarded to the State Authority, the SDMA had not reviewed and approved the plans in respect of the test-checked districts. Further, as per Section 31(5) of the DM Act, copies of the district plan shall be made available to the departments of the Government in the district to enable them to prepare their respective DM plans. However, the stipulation had not been complied with by any of the test-checked districts.

The Government replied (May 2023) that the departments in the districts have not prepared the DM plans, but the district plans were prepared in consultation with the departments concerned. However, there was no evidence on record to justify that the district plans were prepared in consultation with the departments concerned.

2.1.6 Other Disaster Management Plans

2.1.6.1 Government Departments

As per Section 40 of the DM Act, every department of the State Government, in conformity with the guidelines laid down by the State Authority, shall prepare a disaster management plan and annually review and update them. Further, every department of the State Government shall furnish an implementation status report to the SEC regarding the implementation of the disaster management plan.

Audit observed that 16 departments (dealing with functions vulnerable to disasters and as decided by SEC) prepared their DMPs only during 2020-21 and thereafter had not reviewed and updated them. However, none of the departments had furnished the status report to SEC on implementation of planned activities of their departments in managing disasters and thus, SEC did not effectively monitor the preparation and implementation of the DMPs by the departments in the State and integrate various disaster management activities

across the line departments. This affected coordination among the departments in implementing activities in convergence.

The Government replied (November 2022) that the departments did not furnish status reports and hence, the SEC had decided (September 2022) to constitute Disaster Management Cell in 16 departments at the State level to monitor the activities and the process is in progress and further replied (August 2024) that the completion, periodic updation and implementation of DMPs will be ensured through capacity building.

Recommendation 1: The State Government should ensure effective functioning of institutions like SDMA, SEC, DDMAs etc., duly complying with provisions of the DM Act and ensure preparation of integrated disaster management plans at all envisaged levels.

2.1.6.2 Local Authorities

As per Section 3.2.7 of the State Policy, all the local authorities[8] were to prepare DMPs in consonance with guidelines of NDMA, SDMAs and DDMAs. Audit observed that none of the local authorities in the test-checked districts had prepared the required DM plans indicating absence of effective monitoring by the SDMA and DDMAs of preparatory activities for disaster management at grassroots level.

Though the Revenue Department (DM) replied (May 2023) that 2,250 out of 6,300 Gram Panchayats (GP) have prepared the DM plans, none of the plans were available in physical records at the test-checked district and taluk level offices, produced to Audit for verification.

2.1.6.3 Hospital/Educational Institutions

The SDMP of 2018-19 stipulates that every hospital shall have a Disaster Management Plan (DMP) for disaster management incorporating measures towards preparedness, mitigation, medical relief and rehabilitation *etc*. Similarly, the SDMP had made it mandatory for every school/college in the State to have a DM plan.

However, scrutiny of records made available showed that none of the hospitals (except a few private hospitals under Bengaluru Urban district) and educational institutions in the State as well as test-checked districts had prepared the required disaster management plan. The Commissioner, Health and Family Welfare Services stated (October 2023) that nodal officers are being trained during 2023-24 regarding preparation of DMPs.

It is mentioned in SDMP 2019-20 that training has been imparted to about 400 Medical Officers in the last 3 years, whose expertise can be used for preparing hospital DM plan. However, effective action had not been taken by the Government/departments to utilise their expertise in preparing hospital DM plans.

[8] Panchayati Raj Institutions (PRIs), Municipalities and Town Planning Authorities which control and manage civic services.

2.1.6.4 Other agencies

The SDMP (2019-20) stipulated preparation of disaster management plans by many other essential sources/agencies. Audit observed that while the Onsite and Off-site DM plan was prepared for major accident hazard prone industrial units, the other envisaged plans like Dams - Emergency Action Plan, Railway Disaster Management Plan, Railway Disaster Response Plan, Heritage Area Disaster Management Plan, DM plan for Large Congregations and Crowds, Cyber Crime Management Plan, Animal Care Management Plan during disasters, *etc*., were not prepared, by the State Government/KSDMA in coordination with the agencies concerned, even as of March 2023.

The Government replied (February 2024) that suitable instructions would be issued in this regard to ensure preparation of DMPs by all the authorities, as required. However, the Government did not furnish either details of the instructions issued or compliance thereon by authorities/agencies in preparation of their DMPs (August 2024).

2.1.7 Non-availability of Disaster Management Plans/publications in regional language

The disaster management plan is a policy document which needs to be disseminated up to the last mile community being the first responders to any disastrous event. Further, the State Government had brought out certain publications[9] relating to management of different disasters.

Audit observed that except for SDM Plan 2019-20 and SDM Policy 2020, none of the action plans/publications were available in the local language to enable ground level officials/volunteers to understand and act appropriately. Though a decision was taken by the SEC during 2019-20 to bring out the SDMPs in regional language, the same was not implemented and thus, the Disaster Management Plans were not available in regional language at the State, District or GP level.

The Government replied (August 2024) that action would be initiated to e-publish important plans/action plans/policies related to disaster management in the regional language.

2.1.8 Crisis Management Committee and Plan

As stipulated in the Government of India's (GoI's) Crisis Management Plan (July 2007), the State Crisis Management Committee (SCMC) comprising high-level officials of the State Government headed by the Chief Secretary shall deal with major crises which have serious ramifications. The SCMC was to be activated in the event of crisis and it shall be assisted by the SEC as may be necessary.

Though the Crisis Management Committee/Group was constituted in the State (2010 and 2017) both at the State level and district level, no details were forthcoming from the records of the nodal department regarding the activation of the Committee/Group during any of the disasters the State had encountered during the period 2017-18 to 2022-23. Further, the specified Crisis Management

[9] State Disaster Management Policy, Action Plan for Flood Risk Management, Action Plan for Landslide Management, Thunder and Lightning Action Plan, *etc.*

Plan (*vide* Government Order dated 19 July 2017) was not prepared in the State by any of the authorities.

The Government replied (August 2024) that the contingencies arising in future due to notified calamities will be dealt by SEC and DDMA through SDMP and DDMP respectively.

2.1.9 Emergency Operation Centres

The State Government had put in place (2013) the State Emergency Operation Centre (SEOC) at the State level and District Emergency Operation Centres (DEOC) at the district level which shall be the nerve centres for coordination and management of disasters. In accordance with the State Plan, the SEOC was responsible for operationalisation of Disaster Management Action Plan of all the districts, operationalisation of Standard Operating Procedures by/for various departments, monitor preparedness measures undertaken at district levels, prepare action taken report for Chief Secretary *etc*.

Audit conducted (September 2023) a joint physical verification of the SEOC along with the staff of nodal Department and observed that the SEOC was under-equipped (in terms of human resources and infrastructure) and remained ineffective for the following reasons:

- The space meant to accommodate SEOC and refurbished at an expenditure of ₹61.84 lakh (out of State Disaster Response Fund (SDRF) grants during 2020-21) was being used for other official purposes and thus, there was no place of functioning for SEOC.
- The posts of Director, Consultant and the Liaison officer were not filled.
- As provided in the SDMPs, the SEOC was the nerve centre for coordination in management of disasters which was to be equipped adequately with state-of-the-art technology equipment like video walls/large display TV sets, computers, laptops, fax machine, landline and mobile phones, satellite phones, VSAT connectivity, data wall with feeds from IMD, NRSC, INCOIS, CWC and all major media networks. However, the SEOC had only four desktops and one laptop, two landline phones and one printer.
- Both television sets provided to SEOC were not working and were seen placed in a corner at the time of JPV. Consequently, the SEOC did not have access to live telecasts of news relating to disasters.
- Call logs which are prominent in the functioning of SEOC for disaster specific complaints were not maintained and hence, Audit could not ensure functioning of the system as envisaged.
- Parts of the State were severely affected by floods/rainfall during the years 2019 and 2022 and Kodagu district experienced devastating landslides during the years 2018 and 2020. However, there was no evidence on record to show that SEOC was activated and coordinated rescue and relief operations.

Thus, the existence of SEOC at the State level complied with the provisions of the DM Act, however it's functioning was affected, due to lack of functional resources.

Similarly, the DEOCs were to function as Control Room at the district level with Command, Control and Communication for effective response in an emergency through which management would be able to minimize the hardships of the community and improve the quality of the process of recovery. This control room was to provide timely support and well-thought-out interventions to the grassroots staff as well as volunteers. However, the DEOCs in the test-checked districts were also either non-existent or under-equipped, except for Dakshina Kannada district, which was equipped with display units and other essentials.

State Government replied (August 2024) that SEOC is being integrated with Emergency Response Support System (ERSS) and the Common Alerting Protocol (CAP). SEOC is being equipped with state-of-the-art communication equipment, infrastructure and will be shifted to KSNDMC premises to strengthen further.

The State Government needs to expeditiously address the strengthening of EOCs which are local centres for managing response activities when a disaster strikes.

Recommendation 2: The State Government should revamp the Emergency Operation Centres at all levels while ensuring availability of key infrastructure and form sector specific teams to deal with different disasters.

2.2 Capacity Building

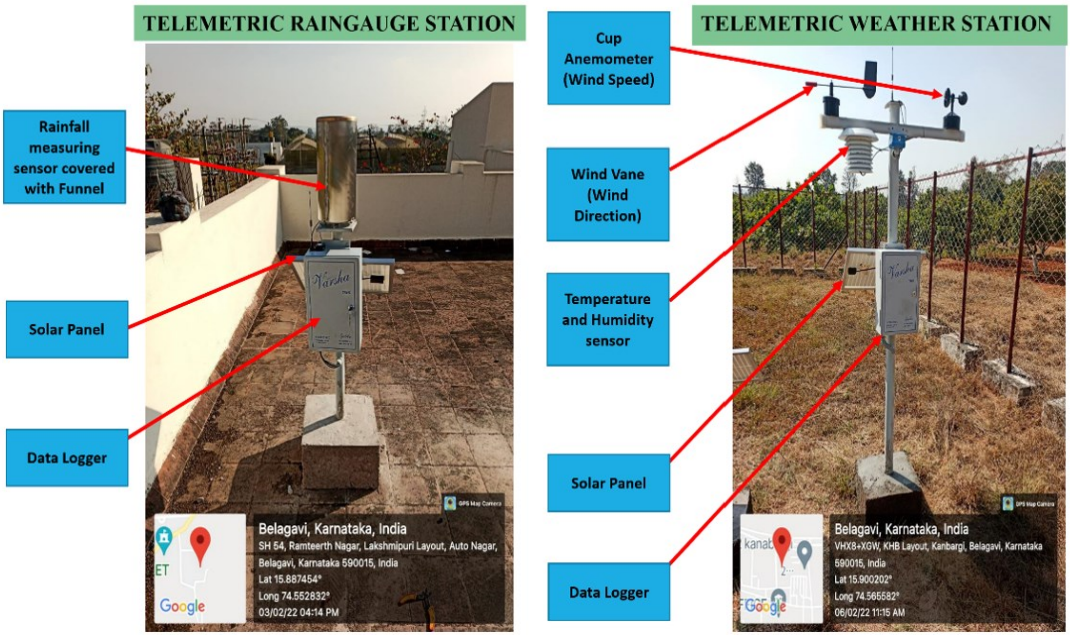
Section (2)(b) of the DM Act defines capacity-building to include: (i) identification of existing resources and resources to be acquired or created; (ii) acquiring or creating resources identified; and (iii) organisation and training of personnel and coordination of such training for effective management of disasters. Audit observed that the expenditure of the Government towards capacity building and preparedness during the Audit period was grossly inadequate.

2.2.1 Weather forecast mechanism

Forecast mechanism plays a crucial role in disaster management by providing early warnings and predictions to help management and communities prepare for and mitigate the impact of potential disasters.

In Karnataka, the State Government established (1988) the Drought Monitoring Cell (DMC) as an institutional mechanism which was subsequently (2007) renamed as Karnataka State Natural Disaster Monitoring Centre (KSNDMC) broadening the activities to include monitoring of other natural disasters like flood, thunderstorm-lightning, earthquakes, *etc*. The KSNDMC was to provide necessary weather forecasts, early warnings and analysis for the State to make appropriate decisions. State Government provided funds for the activities of KSNDMC under the capacity building component of State Disaster Response Fund.

Exhibit 2.1: Photograph showing the TRG and TWS



Source: KSNDMC

As of December 2023, the KSNDMC had established a network of forecasting mechanisms as detailed in **Table 2.2** below.

Table 2.2: Details of KSNDMC Network for Early Warning System

Type of Early Warning System	Number	Disaster
GPRS enabled and solar-powered Telemetric Rain Gauges (TRGs) at the Grama Panchayaths level	6,358	Flood and Drought
Telemetric Weather Stations (TWSs) at Hobli level	834	Flood and Drought
Seismic observation centres	15	Earthquake
Lightning detectors	11	Lightening
Reservoir level sensors	6	Flood
RADAR Stream gauges in Krishna River basin	9	-

Source: Information furnished by the KSNDMC.

Through these networks and in alliance with IMD and Space Application Centre, Ahmedabad, the KSNDMC was generating/disseminating weather forecast alerts/advisories relating to rainfall and its intensity, temperature, humidity, wind speed, wind direction, seismic activities, lightning activities, *etc*., to the stakeholders and general public in near real-time through media platforms.

Scrutiny of records at KSNDMC relating to forecast mechanism for different disasters disclosed that the data collection, forecasting and dissemination mechanism in place in the State was flawed with defunct/faulty equipment, deficient data, improper contract management, non-creation of disaster models, non-installation of sensors, *etc*., which are discussed in disaster-wise chapters.

2.2.2 State Disaster Response Force

Section 44 of the DM Act provided for constitution of National Disaster Response Force for specialised response to natural and man-made disaster and Section 3.4.5 of National Policy on Disaster Management 2009, stipulated that

the State Government was required to put in place their own State Disaster Response Force (DRF) for quickly responding to disasters.

The State Government constituted four DRF units at Bengaluru, Mangaluru, Belagavi and Kalaburagi in June 2013 and the fifth unit at Davanagere in June 2022. The DRFs were functioning under the administrative control of Fire and Emergency department. Each unit had a sanctioned strength of 127 personnel comprising mainly of the police and fire service personnel. Review of records showed the following:

- The units had huge vacancies ranging from 67 to 96 *per cent* of the sanctioned strength because of which the units faced difficulties in managing shift-wise duties and rescue operations. The vacancies were mainly in the cadres of police inspectors and constables. The department stated that ex-army personnel were being recruited through outsourcing.
- All the DRF units were functioning from the buildings of other offices and did not have their own infrastructure. Audit observed that though adequate land has been sanctioned by the Government, same had not been made use of by the DRF.
- None of the posts of fire personnel was filled up in Mangaluru unit and only one fireman was available against the total sanctioned strength of 30 fire personnel in Davanagere unit. One post of Medical Officer sanctioned for each unit remained vacant in all the units.
- The DRF units were provided only a control room landline telephone connectivity and thus, were functioning without any advanced communication network. DGP (DRF) replied (July 2023) that the units are in need of exclusive communication equipment like wireless sets, closed user group mobiles, *etc*.
- Though the State was affected by floods recurrently, the units were not provided with trained divers.
- No funds were released to the Fire and Emergency department for training activities during the Audit period.

Thus, the SDRF units were ill-equipped with respect to equipment and personnel to be of any effective use.

Further, Government allocates funds for Fire and Emergency Services Department through its annual budget for its 'general' functions and activities towards fire forces and also towards salary and other components of SDR Force companies/personnel (like building and infrastructure, medical expenses, transportation, telephone charges, *etc*). The Revenue Department (DM) releases funds, under capacity development component, which is to be expended only towards training activities and procurement of rescue equipment required for disaster management activities.

The details of funds released by Revenue Department (DM) to SDR Force (2013-14) are as detailed in **Table 2.3**.

Table 2.3: Details of funds released by Revenue Department (DM)

(₹ in crore)

Year	Opening Balance	Receipts	Expenditure	Lapsed	Closing Balance
2013-14	0.00	7.63	2.89	0.00	4.74
2014-15	4.74	0.00	0.00	0.00	4.74
2015-16	4.74	1.00	0.05	0.00	5.69
2016-17	5.69	0.00	0.00	0.00	5.69
2017-18	5.69	0.00	0.00	0.00	5.69
2018-19	5.69	0.00	0.00	0.00	5.69
2019-20	5.69	20.09	18.09	0.00	7.69
2020-21	7.69	0.00	0.00	0.00	7.69
2021-22	7.69	0.00	0.00	0.00	7.69
2022-23	7.69	14.65	2.65	12.00	**7.69**
Total		**43.37**	**23.68**	**12.00**	

Source: Information furnished by Deputy Director, SDR Force.

With respect to capacity building, out of ₹1.33 crore released towards training activities during 2013-15 (prior to audit period) only a sum of ₹38.54 lakh was utilised by the department. No funds were released for training activities during the audit period of 2017-23. It has also been observed that as at the end of March 2023, a total sum of ₹7.69 crore was lying in the bank account of SDR Force, with lapse of ₹12.00 crore of allocated funds during 2022-23

The State Government replied (August 2024) that detailed information on functioning of SDRF will be obtained from the concerned department and will be suitably addressed. Further, it is added that adequate funds were provided to the Fire and Emergency services. However, the DRF units continued to be in need of personnel and equipment.

Recommendation 3: The State Government should ensure adequate capacity building by training officials at all levels for effective management of disasters at ground level and also strengthen the State Disaster Response Force.

2.2.3 Centre for Disaster Management

The State Government established (2000-01) the Centre for Disaster Management at Administrative Training Institute, Mysuru (CDM-ATI) for capacity building activities. The CDM-ATI was involved in training, research, documentation and development of state-level information based on disasters and management.

A review of the records/information furnished by CDM showed the following:

- CDM was preparing the State DMPs and imparting training to district/departmental authorities for preparation of respective DMPs.
- The centre was functioning with five trainers handling training programmes for all sorts of hazards.
- A total of 10,358 personnel of different cadres were provided training at CDM.
- The centre had provided training on disaster management to 4,900 elected representatives and 496 personnel of Non-Government

Organisations/civil societies (only in Mysuru city limits). Hence, the efforts at capacity building of the communities and community-based organisations in the State to handle emergencies were inadequate.

- As a capacity building measure, the SDMPs prescribed table-top exercises, simulations, and mock drills to improve operational readiness. Simulation techniques would be the best way of imparting practical training and demonstrations. However, simulation facilities for different types of disasters are not available at CDM.

The Government replied (August 2024) that the present initiatives of capacity building where government employees being trained in the CDM, Mysore in a phased manner was not effective and sufficient. Hence action is being taken to shift the capacity building activities to KSNDMC and setting up of the Karnataka State Institute of Disaster Management.

2.2.4 National Disaster Management Information System

The National Disaster Management Information System (NDMIS) is a comprehensive online application, developed by the Ministry of Home Affairs to capture disaster damages and losses effectively and also to monitor funds disbursal to the States for relief activities in case of disasters. The online System was to track the impacts of hazards for the entire country up to the district level.

The State authorities and their respective districts were responsible for entering the data of their local disasters[10] on a daily basis. The State Government was also to provide online data on expenditure incurred from SDRF (including additional central assistance from NDRF) in line with the GoI-approved norms, on a real-time basis.

Audit observed that the database is not being updated on a daily basis either at the State level or district level. Thus, both the SEC as well as the department did not effectively monitor the utilisation of funds for DM activities indicating absence of an effective internal control mechanism. The non-maintenance of prescribed financial records and incorrect reporting is a matter of serious concern and the possibility of misutilisation/ misappropriation of SDRF funds cannot be ruled out.

The Government replied (August 2024) that instructions have been issued to districts and concerned departments to update requisite information on a regular basis in NDMIS portal.

2.2.5 Aapdamitra scheme

The NDMA approved (2016-17) a Centrally Sponsored Scheme called "*Aapdamitra*" with the objective of (a) training community volunteers with skills needed to respond to their community's immediate needs in the aftermath of a disaster, thereby, enabling them to undertake basic relief and rescue tasks during emergencies such as floods, flash floods, and urban flooding, when emergency services are not readily available and (b) to create a Community

[10] Such as death, injury, affected population by categories, economic losses in sectors such as education, health, housing, agriculture, industries, critical infrastructure such as roads, bridges and buildings, cultural heritages *etc*.

Emergency Stockpile/Reserve at the district/block level containing essential search and rescue equipment, medical first aid kits.

Scrutiny of records showed that training was imparted during June to August 2022 under this project to 3,400 volunteers in 11 districts at a cost of ₹4.14 crore. Audit, however, observed that the Emergency Responder Kits were not procured and distributed to any of the trainees. No records were also available in any of the test-checked districts indicating that the services of these trained volunteers were utilised for rescue operations during hazards. Hence, it could not be ascertained as to whether the trained volunteers were utilised during the rescue operations, and even if they were engaged, rescue operations would have been ineffective without the kits.

As a result, the State could not achieve the objective of the scheme as the trained volunteers cannot effectively perform their rescue operations during hazards without these kits.

The Government replied (August 2024) that Fire and Emergency department was instructed (March 2024) to procure Emergency Responder Kits for the volunteers trained under the scheme.

2.2.6 Capacity building activities at District level

As per Section 30(2) of the Disaster Management Act, the powers and functions of DDMA, *inter alia*, included review of capacity building plans and providing community training. Further, the local bodies were also required to ensure capacity building of their officers and employees for managing disasters, carrying out relief, rehabilitation and reconstruction activities in the affected areas. Audit observed that no funds were provided to DDMAs towards capacity building and training till the year 2020-21. The State Government commenced release of funds only after the recommendations of the XV Finance Commission.

The Revenue Department endorsed (August 2023) the replies of the CDM-ATI which stated that a total of 9,844 personnel were trained at district/taluk/Grama Panchayat levels. Scrutiny of the reply revealed that the training was provided only to the government officials and elected representatives. The fact, however, remained that capacity building activities were not provided to the first responders[11] at the community level.

Details of community level training provided were not available with any of the test-checked districts, except in Dakshina Kannada which reported two training schedules. Similarly, none of the test-checked districts conducted mock drills for any type of natural hazards, except for Dakshina Kannada which reported mock drills at major accident hazard industrial/chemical installations.

Thus, as community level training was not provided in all districts, the training provided in the State under capacity building was inadequate to handle disasters. The Government replied (August 2024) that capacity building measures will be taken up to empower local population against vulnerable disasters through task force committees both in urban and rural local bodies.

[11] Local residents, voluntary rescue workers, *etc.*

2.2.7 Insufficient IEC activities towards disaster management

A crucial pathway to reduce disaster risk is to generate awareness among the people about disastrous events and educate them to deal with such situations. Information, Education, and Communication (IEC) activities play a crucial role in disaster management by facilitating the dissemination of information to the public, promoting awareness, and educating communities on preparedness, response, and recovery measures, thereby enhancing overall resilience and reducing the impact of disasters.

In this connection, Audit observed the following:

- None of the authorities like KSDMA, SEC or Revenue Department (Disaster Management) had taken up effective IEC activities at the macro level towards disaster management like mass communication through radio/television on do's and don'ts of various natural and man-made disasters, preparedness and response activities, reacting to emergency situations, *etc.*
- It was decided in the SEC meeting (September 2022) to release a sum of ₹7.44 crore to the districts for awareness and IEC initiatives. SEC further resolved (February 2023) to release the funds towards awareness and IEC activities only after transforming the material, prepared by the National Institute for Disaster Management (NIDM), ATI and UNICEF, to the State's applicability. However, no action has been taken either by SEC/nodal department for customisation of these materials. Consequently, funds were not disbursed to districts by the nodal department even as of October 2023.
- NIDM, a premier institute for training and capacity building, aimed to create interest and raise the level of knowledge, skill and awareness on disaster management by offering free-of-cost self-study courses for the public, government officials and other stakeholders. This facility could be accessed by anyone from anywhere in the country at his/her convenience in flexi time. However, the nodal department neither provided any publicity among the public/NGOs/CSOs regarding availability of such an opportunity nor encouraged government officials to get enrolled for free-of-the-cost courses.

Thus, the State Government had not taken any effective action towards reaching out to the people exposed to disaster risks at the grassroot level through the vital aspect of community awareness and IEC activities. This gap may lead to delayed or inadequate responses, increased vulnerability and disturbances during disasters which could hinder recovery efforts.

The Government replied (August 2024) that digital IEC materials have been created for various disasters during 2023-24 which have been disseminated to all the districts and on social media platforms. It is further stated that an Executive IEC Consultant is being hired to oversee the preparation of creative IEC visuals.

The reply cannot be accepted as State Government could have utilised/ customised the IEC material already prepared by NIDM and UNICEF and available free of cost instead of appointing another Executive Consultant for

IEC, which would additionally burden the SDRF grants. Further, neither were copies of the disseminated digital IEC materials nor social media links furnished to audit.

Recommendation 4: The State Government should prioritise IEC activities at all levels to create awareness and better educate communities on disaster management.

2.2.8 Strengthening of State/District Authorities

Sections 16 and 29 of the DM Act stipulate that the State Government shall provide the State and District Authorities with such officers, consultants and other employees as it considers necessary for carrying out the functions.

While KSDMA was grossly understaffed, the State Government had not assessed the number of staff required for the functioning of the District Authorities. Audit observed that a total of 32 DM Professionals were appointed (31 professionals at district level and one at the State level) on an annual contract basis under the centrally sponsored scheme 'Strengthening of State Disaster Management Authorities and District Disaster Management Authorities[12]', to manage all the activities pertaining to DM.

To discharge the expected duties and responsibilities[13], the District Professional was to be trained onsite as well as off-site for acquiring knowledge base and management of all sorts of disasters, which also helps in preparation of DDMP comprehensively. This requires the professional to extensively move around the district to understand the terrain and local ground realities and explore ways of handling disasters. The status of the fundamental facilities/requirements provided to the district DM professionals was as detailed in **Table 2.4** below:

Table 2.4: Fundamental facilities/requirements provided to the district DM professionals

Facility/Requirement	Factual status
Comprehensive training at NIDM and other high-level institutions for all sorts of disasters	Training was not provided to any of the Professionals, except for the person in Dakshina Kannada who was given theoretical training twice for 3 and 5 days respectively
Exclusive communication network (satellite phone/hot line/wireless set/mobile phone *etc*.) to be in contact with district administration and DDMA in handling disasters effectively	A wireless walkie talkie provided only for the Professional at Kodagu district
Simulation training to understand the ways for planning prevention as well as response activities to various disasters	Not provided to any of the Professionals
Specialised training for dealing with special emergency situations	
Training in conducting mock drills in different types of disasters (both pre and post disaster activities)	

[12] The NDMA formulated (2015) the scheme with the objective of improving the effectiveness of all SDMAs and DDMAs and making them functionally operational by providing dedicated DM professionals for taking up prevention, mitigation, preparedness and capacity building measures to deal with the threatening disaster situation or disasters.

[13] Which included carrying out hazard risk vulnerability assessments, updating the DDMP, implementing DRR activities/programmes, facilitating community training and awareness programmes, organising mock drill and Information, Education and Communication (IEC) activities for district specific disasters *etc*.

Facility/Requirement	Factual status
A designated vehicle for exploring the vulnerable terrains during the disaster as also travelling for arranging awareness/IEC to the last mile community	
Appropriate lifesaving equipment (terrain specific shoes, raincoat, helmet, lifeguard, mask, *etc*.)	
Social security measures (life insurance, medical allowance/facilities	
Travelling/daily allowance towards extensive travelling to different parts of the district	

Source: Data obtained by district disaster professionals in the form of a google spreadsheet issued through Revenue Department.

Thus, the district DMPs were expected to function without basic social security benefits to their own life and suitable simulative training. To expect a person without wide range of training to be prepared against all possible hazards and draft comprehensive disaster management plan as well as impart community training for capacity building, *etc*., was not prudent.

It is imperative to mention here that the professionals were not being used for the envisaged core functions and in the absence of required facilities the productivity/ outcome of these professionals was doubtful.

The Government replied (August 2024) that action has already been initiated to provide required staff for KSDMA for effective functioning and will further be strengthened through World Bank Programmes. However, the Government's reply was silent on absence of fundamental facilities/ requirements for the district DM professionals at the grassroot level.

2.3 Incident Response System

Disaster response is a multi-agency function. The nodal department (Revenue Department (Disaster Management)) was responsible for managing and coordinating the response while other departments/agencies were to support and aid in managing the incidents. The SDMP details the response activities to be carried out in cases of disasters.

The SDMPs envisaged an Incident Response System (IRS) in the State involving different authorities and functionaries. Accordingly, the State Government had to activate the Incidence Response Teams (IRTs) at the State, district or taluk level and ensure coordination with SEOC. The details of IRTs established and put to action during any of the disasters were not documented at any level.

The Revenue Department replied (May 2023) that inputs from all the stakeholder departments are being sought and the IRS would be formulated and notified. However, the Government did not offer any comments (August 2024).

Chapter - III
Financial resources and Utilisation

CHAPTER III

Financial resources and utilisation

This chapter reveals gaps in financial resources and their utilisation. The State's minimal allocation of funds for capacity building, preparedness, and mitigation activities hindered its transition from response-oriented approach to disaster risk reduction strategy.

Financial management in the State was deficient due to non-maintenance/ incomplete records and lack of reconciliation. Instances of lapsing of grants, parking of funds with banks/implementing agencies, non-submission of utilisation certificates, ineligible expenditures, violation of SDRF norms and unexplained expenditure out of donations from citizens/corporate bodies towards disaster management were noticed.

The funds released by the Centre were poorly documented. The irregular operation of multiple bank accounts at the taluk level further complicated fund tracking and raised concerns about potential misappropriation. Omissions such as the absence of disaster-wise expenditure data, improper maintenance of cashbooks by the district and taluk authorities, mismatch between districts and taluks financial records hindered accurate assessment of fund utilisation by audit.

Management of response activities to notified disasters in the State is funded through the State Disaster Response Fund (SDRF) constituted under Section 48 (1) (a) of the DM Act. The Government of India (GoI) contributes 75 *per cent* of SDRF allocation and the State contributes the balance 25 *per cent.*

The National Disaster Response Fund (NDRF) constituted under Section 46 of the DM Act supplements the SDRF of the State during disasters of severe nature when adequate funds are not available in SDRF. As per recommendations of the XV Finance Commission and accepted by the GoI, the central financial grant-in-aid to the State was renamed as the State Disaster Risk Management Fund (SDRMF) and involves two components *i.e.*, State Disaster Response Fund and State Disaster Mitigation Fund (SDMF). The allocation between the two is in the ratio of 80:20 respectively.

In the State, the Revenue Department (DM) manages the finances for receipt/ expenditure towards DM and maintenance of accounts thereon. The SDRF funds are operated through the Treasury at the State and district level and through bank accounts at the taluk level[14]. The SEC is responsible for ensuring that the money drawn from SDRF is utilised for the purpose for which the SDRF was set up, expenditure is incurred on stipulated items as per norms and not diverted for inadmissible expenditure *etc*.

3.1 Finance management

3.1.1 Improper maintenance of financial records

The Karnataka Financial Code, 1958 (Articles 327 to 345) explains the procedure for handling cash and maintenance of its account. Audit, however, observed that besides improper maintenance of cashbook, concurrent records like comprehensive

[14] Government instructed the taluks to operate funds through treasury since 2022-23 onwards.

set of receipt/release orders, reconciliation statements, annual balance confirmation certificates, *etc.*, were also not maintained in the nodal Revenue Department. Non-maintenance of prescribed financial records with periodical reconciliation, despite carrying out financial transactions of high value was, thus, a gross violation of the codal provisions and canons of financial propriety.

In the absence of prescribed financial records, Audit could not ensure the correctness of the receipts and expenditures incurred/exhibited in the financial statements made available to Audit.

The Government replied (August 2024) that directions have been issued to the concerned to maintain records properly and to conduct periodical reconciliation.

3.1.2 Receipts and Expenditure

In the absence of necessary financial records at State level, the statement of receipts and expenditure of the State towards disaster management (as furnished by the nodal Revenue Department) for the period 2017-18 to 2022-23 is depicted in **Table 3.1** below.

Table 3.1: Receipts and Expenditure for disaster management

(₹ in crore)

Year	OB	NDRF	SDRF		SDMF		Additional grants from State	Total releases	Expenditure
			GoI	State	GoI	State			
2017-18	1235.52	913.04	228.75	76.25	-	-	37.19	2490.75	2,411.61 (97)
2018-19	-	959.84	288.00	32.00	-	-	400.00	1679.84	1,207.22 (72)
2019-20	434.62	2744.26	204.00	132.00	-	-	1500.00	5014.88	4,899.52 (98)
2020-21	-	577.84	632.40	210.80	158.20	52.60	608.13	2239.97	2,238.37 (100)
2021-22	-	1734.3	632.40	210.80	158.20	52.60	2426.27	5214.57	5,003.75 (96)
2022-23	-	939.83	664.00	221.33	-	-	1179.61	3004.77	2,939.41 (95)
Total		**7869.11**	**2649.55**	**883.18**	**316.40**	**105.20**	**6151.20**	**19644.78**	**18,699.88 (95)**

Source: Information furnished by the Revenue Department (Disaster Management)
Figures in parentheses indicate percentage.

The expenditure reported ranged between 72 and 100 *per cent* of the receipts received during each year, as releases made to the districts and other agencies were booked as expenditure.

Under SDMF, Audit observed that while the State Government released (2020-21) a sum of ₹184.50 crore (out of available ₹210.80 crore) to the districts offices with an instruction not to utilise the grants till receipt of guidelines from Government of India, the entire funds of ₹210.80 crore pertaining to 2021-22 were retained by the State Government, without releasing the funds to implementing agencies. Further, during the year 2022-23, as per the XV Finance Commission recommendations, an aggregate amount ₹221.40 crore (GoI - ₹166.05 crore and State - ₹55.35 crore) was to be provided under SDMF.However, due to non-receipt of earmarked amount from GoI, State Government also did not release its matching share. This resulted in non-execution of mitigative activities in the State with respect to hazards/different disasters, despite availability of funds aggregating to ₹421.60 crore.

The above observation was also mentioned in the CAG's Report No.1 – Government of Karnataka for the year 2024.

3.1.3 Discrepancies in account statements

Since the transactions were operated through the treasury, Audit verified financial transactions with the records of the Office of the Accountant General (Accounts & Entitlements), Karnataka, Bengaluru and noticed discrepancies in exhibition of opening balances, receipts under different categories as well as expenditure figures as detailed in **Appendix 3.1**.

Further analysis showed that as against the actual transfer of ₹4.19 crore to CDM-ATI during 2019-20, the department had reported only ₹4.06 crore resulting in short accountal of ₹0.13 crore. Similarly, during the year 2021-22, though an amount of ₹3 crore was shown as having been released to CDM-ATI, the funds were not actually transferred. Evidently, the department did not reconcile the financial figures periodically.

The Government replied (August 2024) that the expenditure is recorded at the State level based on release orders and reconciled through 62-B[15] issued by the treasury. Any discrepancy with the AG (A&E) figures is likely due to non-drawal or lapsing of released grants by districts or agencies. It is further replied that action is being taken to ensure maintenance and updation of cash books.

3.1.4 Component-wise expenditure

The component wise break-up of expenditure on disaster management, as furnished by the nodal Revenue Department (Disaster Management), is shown in **Table 3.2**.

Table 3.2: Component-wise releases under disaster management

(₹ in crore)

Year	Preparedness and capacity building	Rescue and relief	Reconstruction and Rehabilitation	Mitigation	COVID-19	Total
2017-18	0.52	483.68	1,927.41	0	0	2,411.61
2018-19	0	482.00	725.22	0	0	1,207.22
2019-20	4.86	1,061.42	3,792.88	0	40.36	4,899.52
2020-21	31.60	760.08	577.84	184.50	684.35	2,238.37
2021-22	34.57	663.73	3,143.07	0	1,162.38	5,003.75
2022-23	36.29	631.25	2,177.87	0	94.00	2,939.41
Total	**107.84**	**4,082.16**	**12,344.29**	**184.50**	**1,981.09**	**18,699.88**

Source: Information furnished by the Revenue Department (Disaster Management.

While the State had released funds mainly for reconstruction and rehabilitation activities followed by rescue and relief, the releases for preparedness and capacity building were very meagre (< one *per cent*). The funds released for mitigation remained unspent for want of guidelines from the GoI.

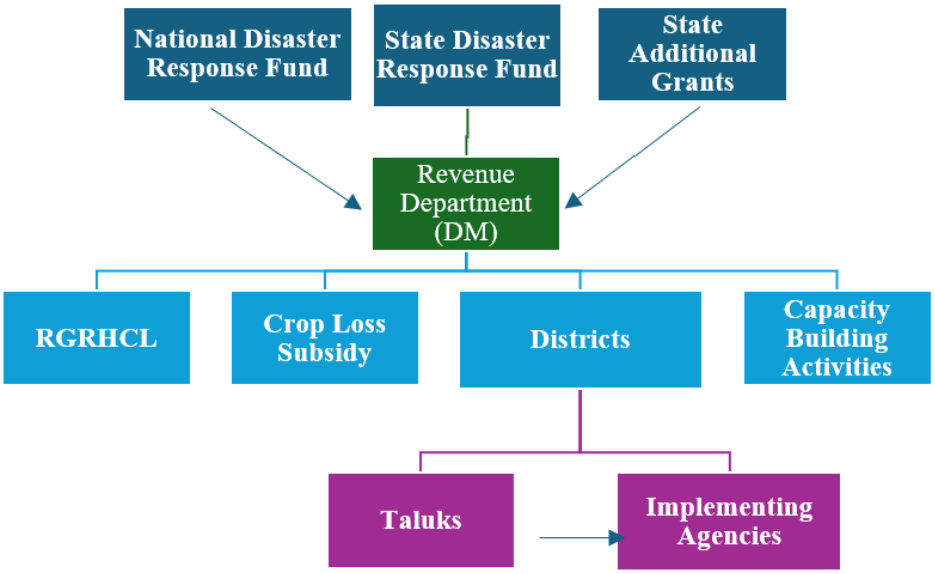
State Government stated (December 2023) that component-wise breakup of expenditure was maintained only from 2021-22 on the recommendations of XV Finance Commission and expenditure towards input subsidy was shown under the head Reconstruction and Rehabilitation.

[15] Treasury schedule depicting head of account-wise expenditure.

3.1.4.1 Expenditure on disaster management activities

The fund-flow mechanism in respect of disaster management is shown in **Chart 3.1** below.

Chart 3.1: Fund flow chart for disaster management



The Revenue Department (Disaster Management), being the nodal department, releases funds meant for disaster management to districts, capacity building departments/agencies and towards input subsidy for crop loss, *etc*., through treasury. The Central grants under SDRF are released[16] annually by the State Government to all the districts, however without indicating Head of account, at times, even without specifying any particular calamity. Thus, the funds released to the districts are pooled in the Personal Deposit (PD) Account of the Deputy Commissioners (DCs) maintained at respective district treasuries.

❖ **Improper accounting of funds**

On scrutiny of fund release orders from State level, Audit observed that the releases were not 'calamity specific/component specific', and many a time included activities relating to multiple disasters (for *e.g.* flood-drought, rain-flood-landslides, etc.) under single Object Head of Account. Audit also observed instances of releasing of funds to DCs, though not affected by disasters, quoting 'insufficient balance - less than ₹5.00 crore' in PD accounts. Further releases from districts to taluks were not with reference either to disasters/component or Head of Account. Hence, the cashbook was maintained as a matter of routine in all the test-checked districts without any distinct account of disaster-wise receipt/expenditure (including expenditure towards COVID-19).

The DCs subsequently released funds to taluks and other implementing agencies (like divisions of PWD, PRED, RWS, *etc*.,) through treasury cheques, based on the local need/demand. The taluks and implementing agencies operate the DM funds

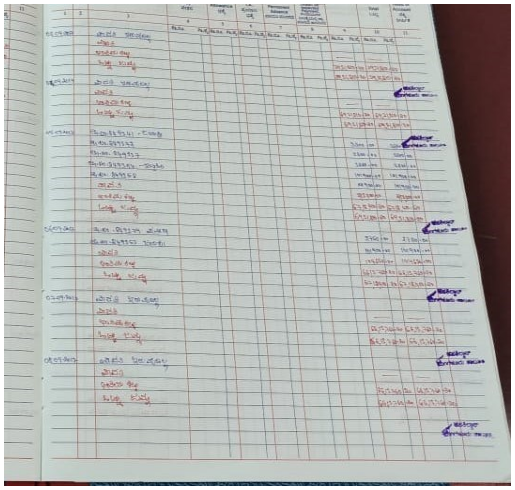
[16] Under heads of account 2245-80-102-0-01-139 (Major Works), 2245-80-102-0-01-059 (Other Expenditure) and 2245-80-102-0-01-051 (Capacity building).

in their bank accounts. While the taluks utilise funds for DM activities like payment of compensations, operation of relief centres, temporary restoration works, *etc*., the implementing agencies execute works entrusted to them by district and taluk authorities. Similar to districts, disaster-wise/component-wise details have not been maintained in any of the test-checked taluks.

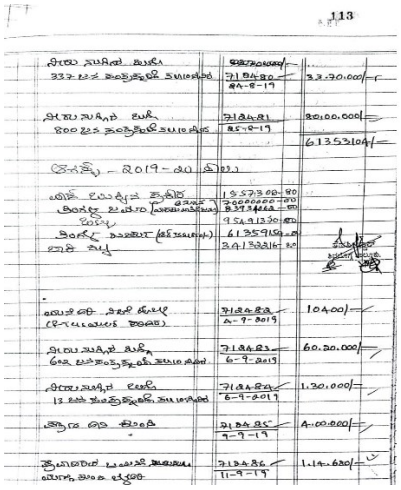
❖ Irregularities in maintenance of cashbook

Audit also observed that while many taluks have not maintained/updated cashbook relating to disaster management, the entries in the maintained cashbooks were improper inasmuch as they depicted non-recording of narrations of the payments, payment to a group of people in a single entry, payments not attested, non-accounting of cheques returned without payment, *etc*. Illustrative photographs of improper maintenance of cashbook are depicted in **Exhibit 3.1** below.

Exhibit 3.1: Photographs showing improper cashbooks



Cashbook of Tahsildar, Mangaluru taluk



Cashbook of Tahsildar, Shivamogga taluk

Source: Joint Physical Verification.

The photographs above clearly evidenced that the cashbooks have been written based on the entries in the bank account pass-sheet, but not as and when the cheques were drawn for payment. In the light of these omissions, fraudulent payments, if any, to ghost beneficiaries could not be traced in Audit. The matter needs to be investigated in detail.

Instances of non/improper maintenance of cashbook and other financial records by the district/taluk level offices in the test-checked districts as shown in **Appendix 3.2**.

❖ Irregularities in maintenance of bank accounts

Further, the taluks were operating multiple bank accounts (two to six) especially in private banks such as HDFC, Axis Bank, YES Bank, ICICI *etc.* Taluk-wise details of multiple bank accounts are shown in **Appendix 3.3**.

Audit noticed that multiple bank accounts opened were without the approval of the Government/competent authority and violated the instructions of the Government issued vide notification of January 2017. Further, the State Government vide order dated 23 May 2022 directed that all Tahsildars should carry out the transactions

relating to Disaster Management only through the Personal Deposit accounts at treasury. However, none of the test checked taluks have switched over fully to PD account operation by transferring the balances to PD accounts. Audit noticed that taluks of Chikkaballapura are yet to open PD accounts and continue to operate SDRF grants through bank accounts (August 2024) only.

❖ **Discrepancies between accounts of districts and taluks**

On verification of cashbooks of test-checked districts and taluks, wherever maintained, Audit observed variations between the releases as per district office records and the receipts shown by the taluk offices. Illustratively, the discrepancies observed in Shivamogga and Chikkaballapura districts are indicated below:

a) DC, Shivamogga released an amount of ₹1.37 crore to Sagara taluk during the year 2017-18. But the same was not traceable in the cashbook as well as in the bank account of the taluk, furnished to Audit. Upon query by Audit, the Tahsildar produced a new bank account statement where the amount was shown to have been released to Rural Drinking Water and Sanitation Department, Shivamogga. However, further details such as copies of release orders/OMs were not made available to Audit.
b) ₹50.00 lakh released by DC, Shivamogga to the Shivamogga taluk vide order dated 28.01.20 was not accounted in the cash book which resulted in understatement of actual receipts and closing balance of grant available with the tahsildar.
c) Chintamani taluk of Chikkaballapura district, despite having a precedence of instances of misappropriation of funds, did not maintain cashbook and did not provide copies of OMs/vouchers in support of fund utilisation either, making it difficult for Audit to vouch for fund utilisation. A special investigation needs to be conducted to derive an assurance about the SDRF expenditure made by Chintamani taluk.
d) In Chikkaballapura taluk, ₹1.03 crore was not accounted in cashbook and the entire amount was debited from bank account by bank authorities on 20.12.21. Upon Audit query, Tahsildar, Chikkaballapura had written a letter (21.08.24) to Bank, wherein it was noticed that a cheque was drawn for the whole amount and kept in suspense for the past three years.
e) Discrepancy noticed in Belagavi district is detailed in **Appendix 3.4**.

Due to the operation of multiple bank accounts and inter-transfer of funds from one account to another, coupled with improper maintenance of cashbooks and absence of proper UCs, it was difficult for Audit to vouch for the transactions of taluks.

Non-maintenance of records and absence of transparency in accounting of funds coupled with non-reconciliation is fraught with the risk of misappropriation/ embezzlement, if any, going unnoticed.

The Government replied (August 2024) that directions have been issued to concerned officials to properly maintain required records and to reconcile the same periodically. Action has been initiated to get the services of State Accounts Department staff on deputation basis to supervise financial transactions pertaining to SDRMF and also engage the services of statutory auditors for audit compliances.

Recommendation 5: The State Government should ensure strict adherence to financial record-keeping and reconciliation procedures to enhance accountability and transparency in financial transactions.

❖ **Substantial unspent balances with districts and taluks and absence of UCs**

Audit also noticed that the district/taluk authorities had significant unspent balances at the end of March 2023 as shown in **Table 3.3**.

Table 3.3: Unspent balances with district/taluk authorities of test-checked districts as at the end of March 2023

(₹ in crore)

District	Unspent balance available in the PD Account of DCs	Unspent balances in taluks[17]	Number of taluks	
			Total	Information furnished
Belagavi	51.08	22.18	14	14
Chikkaballapura	19.87	2.50	06	06
Dakshina Kannada	13.21	2.85	09	09
Davanagere	9.04	3.12	06	06
Haveri	27.58	--	08	00
Kalaburagi	44.35	2.60	11	03
Kodagu	57.04	--	05	00
Ramanagara	19.26	0.87	04	01
Shivamogga	21.07	6.36	07	07
Total	**262.50**	**40.53**	**70**	**46**

Source: Information furnished by district and taluk offices.

The huge unspent balances indicate that the actual expenditure on DM in the State was overstated as the releases to the districts and other departments/agencies were booked as expenditure. This not only resulted in incorrect reporting of expenditure by the State to the GoI/NDMA but also showed the absence of reconciliation and monitoring mechanisms by the department. Though the department could not obtain Utilisation Certificates periodically for the funds released, subsequent funds were released as a matter of routine, without reference to progress of expenditure.

Thus, the absence of details of disaster-wise receipts/expenditure, improper maintenance of cashbooks without due recordings, irregular maintenance of multiple bank accounts, mismatch between districts and taluks financial records, etc., had prevented audit from assessing the correctness of accounts of disaster management, from records made available to audit.

3.1.4.2 Expenditure on capacity building

Analysis of the financial statements furnished by the Department showed that out of ₹107.84 crore, an aggregated amount of ₹47.26 crore (44 *per cent*) was released to KSNDMC and ₹35.73 crore (33 *per cent*) to Fire and Emergency department for capacity building and procurement of essential equipment. Funds released for capacity building activities to the districts and CDM-ATI were 12 and 11 *per cent* respectively of the total releases towards capacity building.

[17] The information to the extent provided by the taluk authorities has been compiled and consolidated.

❖ Utilisation of funds by KSNDMC

Though the Nodal department had stated that ₹46.99 crore was released to KSNDMC during the period 2017-18 to 2022-23, KSNDMC was reported to have received ₹47.89 crore indicating the absence of a reconciliation mechanism. Audit observed that neither had KSNDMC furnished any Utilisation Certificate (UC) for the releases made to it nor did the department insist on the same. The absence of UCs and reconciliation between the department and the agency resulted in discrepancies.

During 2017-23, the KSNDMC spent ₹21.77 crore and as at the end of March 2023 held a balance of ₹27.04 crore[18] in its bank account (savings and deposits) which constituted more than 50 *per cent* of the releases. However, the expenditure incurred by KSNDMC on the below-mentioned items was inadmissible under SDRF grants of the State, due to the reasons mentioned there against in **Table 3.4**.

Table 3.4: Ineligible expenditure incurred by KSNDMC

Name of the work	Expenditure incurred *(₹ in lakh)*	Audit remarks
Supply, Installation, Commissioning and maintenance of Telemetric Rain Gauge, Telemetric Weather Stations and Telemetric Water Level sensors in Mangaluru, Belagavi and Hubballi-Dharwad SMART cities	281.53	These were the activities to be taken care of by the respective municipal bodies and the expenditure was to be charged under SMART City Mission programme.
Hire charges of chartered flight for viewing the flood-affected places in the State during the visit of Inter-Ministerial Central Team	11.22	These administrative expenditures were not admissible under SDRF and were to be borne by the State Government.
Salary to staff	12.91	
Total	**305.66**	

Source: Information furnished by KSNDMC.

Besides, audit observed that KSNDMC had incurred an expenditure of ₹1.03 crore on the work of 'Strengthening of SEOC at KSNDMC' as a control room with communication equipment during the year 2021-22 utilising the funds available under SDRF grants. Concurrently, audit also observed that KSNDMC had incurred an expenditure of ₹61.84 lakh on the work 'Supply, installation of equipment to strengthen SEOC and refurbishment of KSDMA office at MS Building, Bengaluru' with components like video wall, communication/ conferencing equipment, well-designed conference room, *etc*. However, the refurbished room was utilised by the Revenue Department for other official purposes, instead of by the intended SEOC.

As commented in Paragraph 2.1.9 previously, while there was no physical establishment of KSDMA, the SEOC was grossly non-functional at MS Building premises. Thus, the expenditure ₹61.84 lakh incurred towards interior decoration works out of SDRF grants (meant for capacity building and preparedness activities) was clearly ineligible.

[18] Includes interest amount of ₹91 lakh.

❖ **Utilisation of funds by Fire and Emergency Department**

The Revenue Department had released ₹43.37 crore to the Fire and Emergency Department during the period 2013-2022 towards training, capacity building and procurement of equipment for DRF units. The Fire and Emergency Department had utilised ₹23.68 crore and ₹7.69 crore (released towards the components of search and rescue, capacity building and training) remained unutilised and was lying in the bank account as at the end of March 2023. The Fire and Emergency Department did not furnish either the reasons for non-utilisation or action plans for utilisation. Further, an amount of ₹12 crore lapsed during 2022-23 as the department could not utilise the funds timely. This resulted in parking of SDRF grants outside the Government account. It also indicates that the Fire and Emergency department had no plans for the purchase of equipment and capacity building.

❖ **Utilisation of funds by Centre for Disaster Management**

As against ₹9.29 crore actually released to CDM-ATI during the period 2017-2023 for conducting training activities on DM, the Institute had spent ₹4.18 crore and the balance ₹5.11 crore remained in the bank account of CDM and outside the Government account. Audit observed that the average annual expenditure of CDM during the period 2017-18 to 2022-23 was only ₹70 lakh and the percentage of savings ranged between 29 and 89 *per cent* during these years. Hence, release of funds more than the actual utilisation was unwarranted and there was nothing on record to justify the excess releases.

The State Government stated (August 2024) that replies in this regard will be furnished after getting details of the expenditure from KSNDMC, Fire and Emergency Department and CDM-ATI, Mysore.

3.1.5 Release of funds not justified and Utilisation Certificates not obtained

The Nodal Department had released funds to other departments/agencies from out of the SDRF grants as shown in **Table 3.5**. The details of utilisation by the recipients and the detailed statement of accounts thereon were, however, not obtained and placed on record.

Table 3.5: Instances of fund releases to departments/agencies

Year	Department/Agency	Recorded reason	Amount *(₹ in lakh)*
2017-18	Animal Husbandry	Fodder	500.00
	Aero India show	Not on record	27.20
2018-19	Energy Department	Flood infrastructure damage	521.00

Source: Information furnished by the department.

In this connection, audit observed the following:

- The funds under SDRF were released to the DCs of the districts for ensuring temporary restoration of the damages caused due to disasters in the respective districts and the DCs in turn released the funds to implementing agencies for immediate repairs to infrastructure like roads, water supply, electricity, *etc*. The Nodal Department could not clarify the reasons for releasing funds to the Energy Department separately.

As the department concerned was to allocate funds from out of their budget grants for permanent restoration of the damages caused by the disasters, the possibility of duplication in release of funds for same works/purpose both by the Revenue department and the department concerned cannot be ruled out.

- Though a sum of ₹92.00 crore had been released for purchase of fodder during drought, reasons for release of an additional amount of ₹5.00 crore to the Commissioner, Animal Husbandry Department were not on record.

  Further, it is also not ascertainable as to why the funds were released to the Commissioner, Animal Husbandry Department while the responsibility for purchase of fodder lies with the respective taluks.

- Since SDRF funds are to be used for meeting the expenditure for providing immediate relief to the victims, the justification and reasons for release of ₹27.20 lakh out of SDRF grants towards Aero India show were not on record.

The Government did not furnish any replies but stated (August 2024) that necessary details would be obtained from concerned departments.

Recommendation 6: The State Government should obtain utilisation certificates periodically from the authorities concerned in order to monitor utilisation of grants.

3.1.6 Misappropriation of SDRF grants

Scrutiny of records of the Tahsildar, Chintamani taluk under Chikkaballapura district revealed that an office assistant had misappropriated an amount of ₹18.59 lakh during the period 2017-18 by forging the signature of the Tahsildar on 59 cheques and a complaint was lodged with the police authorities during November 2017. Further developments in this regard were not forthcoming from the records.

3.1.7 Payment of compensation under SDRF to ineligible cases

The NDRF/SDRF guidelines stipulate payment of compensation to those affected by natural calamities like house collapse, water flooding into houses, serious injuries, *etc*. The guidelines also provide for compensation payment to human and cattle deaths due to lightning, drowning (including those who participated in rescue operations) during natural calamities.

On test-check of records relating to payment of compensation under SDRF, audit observed that the compensation was paid in the below-mentioned instances, though the cause of death of human/cattle was not related in any manner to natural calamities/disasters.

A total of ₹1.81 crore was paid by the taluks of Haveri district and ₹2.00 lakh by Jewargi taluk of Kalaburagi district, out of SDRF fund, towards suicide deaths and deaths due to snake bite. These cases were actually to be paid by the Department of Social Security and Pensions through DCs.

In Kalaburgi district, compensation of ₹25.00 lakh had been paid out of SDRF grants to an army personnel who died in Naxal attack in Chattisgarh, while the compensation was to be borne by the Department of Sainik Welfare and Resettlement.

Apart from the compensation, audit observed ineligible utilisation of SDRF grants by Kamalapur taluk under Kalaburgi district towards honorarium for persons who conducted crop loss survey (₹0.51 lakh).

3.1.8 Inadmissible expenditure under SDRF

As per the guidelines, SDRF grants shall be used for meeting the expenditure towards immediate temporary restoration of damaged infrastructure due to disasters within the prescribed norms of SDRF. The maximum expenditure that can be incurred on any such individual restoration work was ₹2.00 lakh. The permanent restoration of damaged infrastructure to normalcy was to be taken up through the regular budget grants of the respective departments.
Audit scrutiny of records at district level showed execution of numerous works regarding repair/restoration of damaged infrastructure above the prescribed monetary limit of ₹2.00 lakh, which was inadmissible under SDRF. The district-wise illustrative instances of execution of works in violation of the guidelines and monetary limits are shown in **Appendix 3.5**.

The Government replied (August 2024) that suitable instructions would be issued to Deputy Commissioners to investigate the reported cases and to take necessary legal action against the erring Officers and directions would be given to districts to incur expenditure strictly as per SDRF norms only towards temporary restoration of infrastructure damages.

Recommendation 7: The State Government should direct the authorities to adhere to accounting standards and conduct a thorough investigation into irregular financial transactions.

The Drought Manual mandated the State Government to monitor their drought expenditures regularly through monitoring mechanisms like monthly expenditure statements (both at State and district levels), UCs and internal and external audits.

As per the information furnished by the Revenue Department, a total amount of ₹5,791.47 crore had been incurred towards drought management in the State during the period 2017-18 to 2019-20. However, the details of district-wise releases or items towards which the expenditure had been booked were not furnished to audit.

Besides, audit observed that the State Government/nodal department did not maintain incident-wise data on accounts or expenditure. Besides, none of the test-checked district administrations had submitted the required UCs to the State Government/nodal department either incident-wise or for the total amount received/expended. Internal or external audit of the accounts of drought expenditure was not arranged by the State Government. Evidently, the efforts of the State Government in preparing and monitoring the expenditure on drought relief were inadequate and thus, ineffective.

The State Government replied (August 2024) that during Kharif 2023, all the relief as per the SDRD/NDRF norms is being disbursed through K2 treasury mechanism to maintain transparency and accountability instead of paying input subsidy through funds maintained in a bank account.

3.1.9 Receipts of donations and expenditure therefrom

The department in response to Audit seeking information on the donations received from business firms, contributions from Non-Government Organisations/public

etc., stated (August 2022) that ₹88.82 crore was received as financial donations and ₹1.52 crore was spent.

Audit observed from the records made available that the Revenue Department (DM) did not maintain the required records[19] *viz.*, receipt book, remittance register and the cashbook for recording the transactions towards receipt of donations. Thus, Audit verified the bank pass sheets and noticed that the department had received donations of ₹135.21 crore and had spent ₹35.63 crore between the period August 2019 and September 2023. Clear details of the donors were not ascertainable as the bank extract contained only the cheque number. The quantum of donations received varied from ₹10 to ₹10.47 crore in individual cases. A review of the available records showed that out of the expenditure of ₹35.63 crore, Audit could not trace expenditure of ₹2.34 crore and an amount of ₹1.00 crore was recorded to have been transferred to KSDMA account, the reasons for which were not forthcoming from records made available.

Thus, in the absence of complete records, Audit could not ascertain the total amount received and remitted to the Government. The withdrawal of funds from this account which received donations without recording details was fraught with the risk of embezzlement of funds going unnoticed. The matter needs to be investigated.

The Government replied (August 2024) that action would be taken to maintain proper records in respect of donations received and an Audit team will be constituted to probe any irregularities that have taken place.

[19] Rule 21 of the Government Account (Receipts and Payments) Rules, 1983, states that the Head of an Office where money is received on behalf of the Government shall give the payer a receipt duly signed by him after he has satisfied himself, before signing the receipt and initialling its counterfoil, that the amount has been properly entered in the cash book.

Chapter - IV
Drought

CHAPTER IV

Drought

In this chapter, issues related to impact of drought, drought management, response and relief measures are discussed. The State Government did not bring out region specific guidelines for management of drought though the State had experienced extensive drought regularly. Though the State was the first to establish the Drought Monitoring Cell way back in 1988, the weather monitoring system was flawed with deficiencies such as non-functional equipment, non-installation of soil moisture sensors. The State Government did not have sufficient details regarding socio-economic factors like decline in dairy production, industrial and energy production losses, and the adverse impact on environment.

The efforts of the State Government in managing drought were not comprehensive as preparedness and mitigation measures like forecast mechanism, water conservation, rainwater harvesting, regulating groundwater extraction *etc*., were inadequate. The water supply project taken up for drought mitigation covering two of the test-checked districts (Chikkaballapura and Ramanagara) was inordinately delayed due to frequent changes in design and alignment. The achievement in completion of the items of work in the test-checked districts was insufficient.

Relief employment was provided through MGNREGS only to 2.39 *per cent* of the households in drought affected areas, which was very meagre and thus, did not present an economic rationale for interventions in drought response, relief and mitigation measures.

4.1 Introduction

Drought is a natural hazard and one of the most disastrous among the different natural hazards, as it severely affects all the sectors of society. Its impact, *i.e.*, the damage to the ecology, disruption of socio-economic conditions of communities, the long-term effects of malnutrition on health and morbidity *etc*., are generally non-structural and difficult to quantify and can be reduced only through mitigation and preparedness.

The National Commission on Agriculture in India had classified (1976) drought into three types: meteorological, agricultural and hydrological. Meteorological drought is defined as a situation when there is a significant decrease from normal precipitation over an area (*i.e*., more than 10 *per cent*). Hydrological drought results from prolonged meteorological drought resulting in depletion of surface and sub-surface water resources. Agricultural drought is a situation when soil moisture and rainfall are inadequate to support healthy crops.

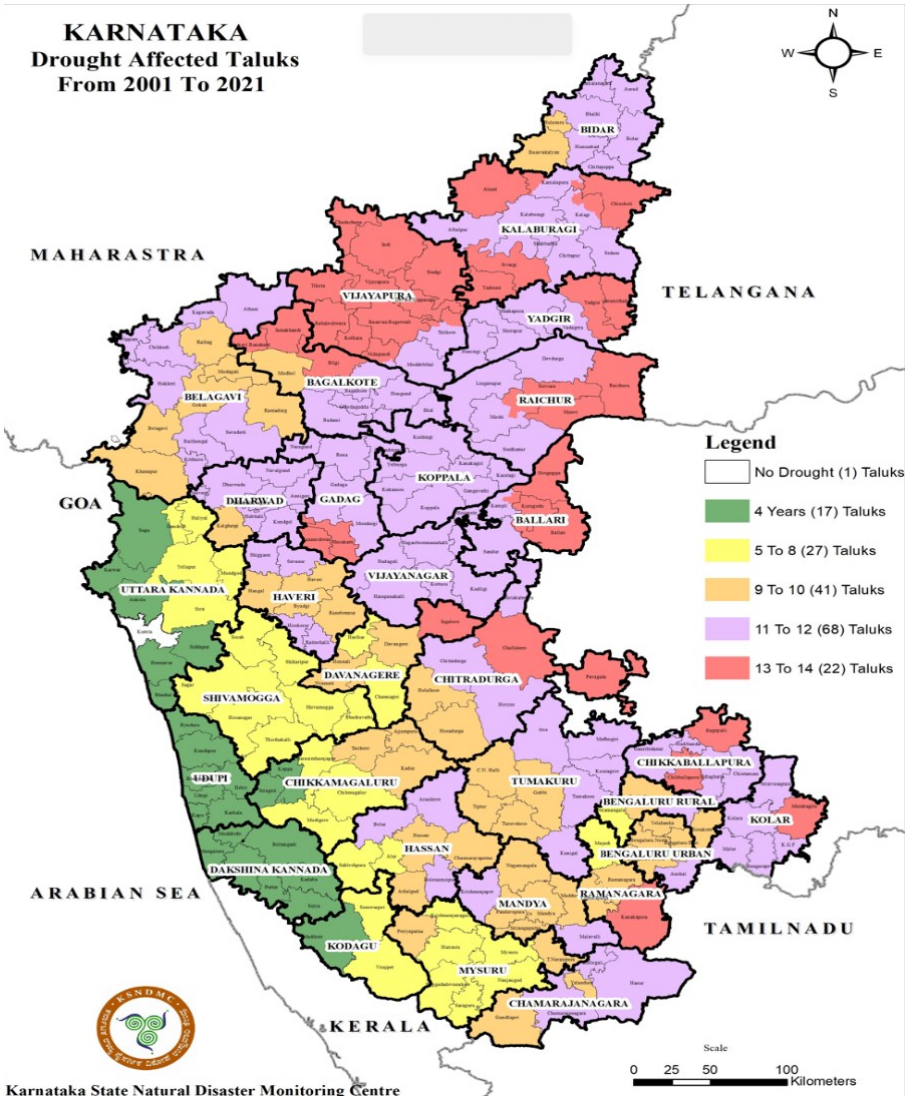
4.2 Drought profile of the State

Karnataka is an agrarian State with more than 70 *per cent* of the people depending on agriculture and most of the cultivable area is rain-fed. Karnataka ranks next to Rajasthan concerning drought. Drought in the State is a common phenomenon due to spatial and temporal variation in rainfall within the region and within the seasons as well. Due to this variability, both spatially and

temporally, different regions are simultaneously prone to disasters like floods and drought in the State. As per the data available with KSNDMC for the period from 2001 to 2022, the State was affected by drought for about 15 years.

Due to sufficient/excess rainfall since the year 2019, the State has not been subjected to drought during 2019-23. The map showing the frequency of drought occurrence during the years 2001 to 2021 is depicted in **Chart 4.1** below.

Chart 4.1: The map showing the frequency of drought occurrence during the years 2001 to 2021



During the period 2017-2023 covered in the performance audit, while the State was affected by severe drought during the year 2018, the intensity of the drought during 2019 was comparatively less. The number of taluks notified as drought-affected under the test-checked districts is shown in **Table 4.1.**

Table 4.1: Number of taluks affected by drought in test-checked districts

District	Total number of taluks	Number of taluks affected	
		2018	2019
Belagavi	14	10	1
Chikkaballapura	6	6	3
Dakshina Kannada	7	5	0
Davanagere	7	6	1
Haveri	8	7	0
Kalaburagi	11	7	3
Kodagu	3	3	0
Ramanagara	4	4	2
Shivamogga	7	4	0

Source: Information furnished by Revenue Department.

Similarly, the year-wise data on the number of taluks affected by drought during 2001-2022 is shown in **Appendix 4.1**.

Audit observed that the taluks under the districts covered under western ghats which used to receive average rainfall over 3000 mm were also distressed by drought, thus, evidencing ineffective mitigation measures.

4.2.1 Drought declaration

Drought declaration signifies the beginning of Government response to conditions representing a drought situation. The Drought Manual brought out by the GoI specified a detailed modality for monitoring and determination of spatial expanse and intensity of drought based on objective parameters, to be further established on the basis of ground truthing through field verification. State Government was to adhere to the stipulations of the manual for an objective, transparent and timely declaration of drought.

Of the six years covered under the PA, State had encountered drought during the years 2018 and 2019. During 2018, while 100 taluks were declared drought hit in the Kharif season, the number of taluks affected with drought increased to 156 during the Rabi season. The effect of drought continued till the Kharif season of 2019 wherein 49 taluks were declared by State Government as drought affected.

4.2.2 Impact of drought

The drought severely impacts the economic, environmental and social sectors at macro and micro levels, both directly and indirectly. The impact of drought has been linked mostly to the agricultural sector, as deficiency of precipitation over an extended period, results in depletion of soil moisture which in turn reduces crop production. Year-wise quantum of crop loss, as estimated by the State Government, during the years from 2013 to 2018[20] due to drought situation in the State is shown in **Table 4.2**.

[20] State did not face drought during 2020-2022.

Table 4.2: Estimated crop loss in the State due to drought

Year	Estimated crop loss (₹ *in crore*)		
	Agriculture	Horticulture	Total
2013	1,016.99	702.30	1,719.29
2014	2,706.17	882.90	3,589.07
2015	21,204.51	1,164.70	22,369.21
2016	22,533.58	1,757.28	24,290.86
2018	26,514.32	1,532.63	28,046.95
Total			**80,015.38**

Source: Memoranda furnished by the department.

As could be seen from the data above, there was a persistent rise in the quantum of loss year after year indicating the upsurge of vulnerability of the State to climatic variations. Besides, drought can result in household food insecurity, water-related health risks, loss of livelihood, *etc*. which affects agriculture as well as other sectors of the economy.

As a relief measure for the population affected by drought, the NDRF/SDRF norms permit the State Government to compensate the loss of crops due to natural hazards at the prescribed rates. The State Government supplemented the compensation additionally through its funding.

Audit observed that the compensation was disbursed through an exclusive portal called '*Parihara*', developed (2016) by the State Government and in the State, a total financial compensation of ₹1,625.39 crore had been paid to the drought affected landholders during the year 2018-19.

4.3 Drought Management

Besides the components of disaster management cycle, drought management in particular encompasses three vital components *viz.*, drought intensity assessment and monitoring, drought declaration and prioritization of areas for drought management, and development and implementation of drought management strategies. The primary responsibility of managing drought is that of the State Government and the Central Government supplements the efforts of the State Government in effective drought management and provides additional resources (foodgrains/financial assistance *etc*.) to combat the situation. The State Government should ensure that the declaration of drought is in accordance with the modalities and timelines prescribed so that relief/assistance can be provided to the drought-affected people on time.

4.3.1 Framework for drought management

As part of the NDM Guidelines, GoI brought out (September 2010) the 'Management of Drought' guidelines which were updated in December 2020. The GoI also had in place the Manual for Drought Management, 2009 which was revised in December 2016. This manual serves as a guide to the Governments and agencies engaged in the prevention, mitigation and management of drought.

Though the State experienced drought situation during most of the years in the past two decades, and the State Government was aware of the spatial and temporal variation of climate/rainfall among the various parts of the State, the

State Government/KSDMA did not bring out region-specific guidelines for management of drought. The topography of the State is distributed widely among vivid climatological regions like humid, sub-humid, semi-arid and arid besides heavy rainfall/dense forest western ghats and malnad region. Hence, there is a need for exclusive region-based guidelines stipulating suitable water harvesting/conservation measures, cropping pattern, contour cultivation methods, sub-surface barriers, irrigation systems, *etc*., to combat the hazards of drought.

The State Government did not furnish any reasons for not publishing region-specific guidelines for the State.

4.3.2 Deficient forecast mechanism

As provided in the Drought Manual, the State Government was expected to develop monitoring systems at the smallest administrative unit levels (*e.g.* Sub-division/Hobli/Taluk/Gram Panchayat etc.), to enable generation of sharper and credible observation data that are reflective of ground realities. However, the weather monitoring system in the State was flawed with deficiencies as discussed below.

4.3.2.1 Non-functional/malfunctioning weather monitoring equipment

The SDMP vests the responsibility of monitoring key indicators for drought declaration to KSNDMC. Though the Government established the Drought Monitoring Cell way back in 1988 in the State, the forecast mechanism was deficient due to under-performance of the installed equipment, as discussed below.

The KSNDMC installed Telemetric Rain Gauges (TRGs) and Telemetric Weather Stations (TWSs) in a phased manner (2009-2015) and refurbished the instruments at different intervals with an annual maintenance contract. On verification of functionality of these TRGs and TWSs, audit observed that the number of these equipment which remained non-functional witnessed an increasing trend, as shown in the **Table 4.3** below.

Table 4.3: Functionality status of TRGs and TWSs in the State

Year	TRGs		TWSs	
	Total installed	Non-functional	Total installed	Non-functional
Upto 2018	5,891	12	834	4
2019	6,240	31	834	5
2020	6,343	159	834	27
2021	6,358	246	834	51
2022	6,358	968	834	102
2023	6,358	2,770	834	463

Source: Information furnished by KSNDMC through email (Status as of 8 December 2023).

As of December 2023, the percentage of defective instruments was 43 and 52 respectively. However, effective action had not been taken by KSNDMC either to repair or replace the defective instruments to obtain the realistic data of weather parameters.

Audit also observed that KSDNMC had not revised the annual maintenance contract for 1,289 TRGs since March 2022 and for 670 TRGs since March 2023, which resulted in non-/malfunctioning of the instruments. Further, a total of 153 TRGs (costing around ₹68 lakh – average cost of ₹45,000/- each) were recorded as "stolen" and 138 TRGs were recorded as 'damaged'. Hence, data was not being recorded from these instruments. Neither had KSNDMC nor the maintenance agency taken any action to ascertain the reasons for theft/damage nor were any complaints filed with the police authorities. Photographs depicting the damaged equipment are shown in the **Exhibit 4.1** below.

Exhibit 4.1: Photographs showing damaged and non-functional weather forecast equipment

Source: KSNDMC.

During the exit conference (January 2024) the State Government attributed the deficiencies in forecast mechanism to absence of maintenance contracts for installed equipment and assured that the issues would be looked into in detail.

Apparently, vital decisions for disaster management are being taken in the State through a deficient forecast mechanism. Reply of the Government highlights its negligence in initiating timely action to renew maintenance contracts (lapsed two years back) or to install new equipment which are crucial for effectively monitoring weather parameters and planning preparatory measures.

4.3.2.2 Non-installation of soil moisture sensors

Measuring soil moisture and moisture adequacy in agricultural systems is one of the crucial components in disaster management, particularly for declaration of drought in a specific location. Soil moisture is highly dynamic in space and time and is measured using soil sensors or satellite remote sensing.

Though Karnataka was second to Rajasthan in encountering ill effects of drought recurrently, the Government had not taken measures for procurement and installation of soil moisture sensors in the State, which could help in region specific drought mitigation plans.

4.4 Preparedness Against Drought

4.4.1 Drought monitoring and preparedness

The preparedness for drought involves strategic planning and resource management to mitigate its impact on communities and ecosystems. Proactive measures are essential to ensure resilience and sustainability in the context of prolonged water scarcity situations. The flowing paragraphs reveal the omissions in this regard.

4.4.1.1 Absence of State Crisis Management Plan

As per Section 2.1.1 of the Drought Manual, 2016 of GoI, it was essential that along with a drought monitoring system, medium and long-term area-specific plans be prepared for drought proofing of susceptible areas. In addition, Crisis Management Plans[21] were to be formulated with care to deal with drought in the short term. Such well-conceived plans, when executed promptly, can go a long way in mitigating distress and disruption to the rural economy and society.

As provided in the Crisis Management Plan of the GoI, the parameters which may indicate an onset of drought conditions are (i) Rainfall (ii) Progression of sowing (iii) Remote sensing based Vegetative Indices, (iv) Soil Moisture Based Indices and (v) Hydrological Indices (Ground water drought index), which are to be monitored. Since crisis management plan relies upon forecast mechanism to predict, prevent and manage drought, deficiencies in forecast mechanism as discussed in preceding paragraphs could be attributable to non-preparation of an effective Crisis Management Plan.

Further, audit observed from the records made available that the State Government/KSDMA/SEC had not formulated the Crisis Management Plan in the State during any of the years (covered under audit) affected by drought.

The Government replied (August 2024) that Crisis Management Plan was formulated during 2023-24 by the Departments of Agriculture, Rural Development and Panchayat Raj and Animal Husbandry to manage drought. The reply thus is in agreement with the Audit observation that no crisis management plan was in place prior to 2023-24.

[21] Crisis Management Plan is part of overall spectrum of drought management but is focused on management interventions required during the time of crisis.

4.4.1.2 Ineffective Crop Weather Watch Group

The State Government had set up a Crop Weather Watch Group (CWWG) in the State to monitor the drought situation in the State on the lines of the CWWG at the national level. As per the Drought Manual of GoI, 2020, the CWWG was to meet once a week during the rainy season (June to September) and the frequency of their meetings was to be increased during drought occurrence to monitor the status of the drought. Audit observed that the CWWG did not meet as envisaged during the years 2017 to 2022. The number of meetings of CWWG varied between zero and six as against the required 16 meetings during the monsoon period of a year.

On scrutiny of the minutes of the meetings held during the drought year of 2018-19, audit further observed that the CWWG decided (28 July 2018) to meet every week to oversee the drought situation in the State. However, no meetings were held thereafter during 2018. Lack of adequate supervision and guidance by the CWWG resulted in affecting the preparedness and response to drought encompassing the State, including those districts/taluks which had faced severe rain/flood/landslides three months back.

The State Government stated (August 2024) that as the State experienced flood during the past four years and was drought hit only during 2023-24, the CWWG is actively functioning and met 14 times. Reply is not tenable as CWWG is required to meet to discuss issues arising not only during drought but also during other natural calamities. However, the reply is silent on shortfall in meetings of CWWG during drought year of 2018 where the estimated crop loss was to the tune of ₹28,046 crore.

4.4.1.3 Drought Management Information System

The Drought Manual stipulated that the State Government should develop a Drought Management Information System (DMIS) at the State level on different aspects of drought management, which was to be replicated at the district and taluk levels with information at each level supporting the DMIS at the higher level. The DMIS was to be updated every week during the period of drought.

The State Government/nodal department did not maintain the stipulated DMIS, either at the State level or district/taluk levels. As a result, the required information on key indicators of drought as well as the important interventions for drought relief like employment, support to farmers, food security, drinking water, supply of feed and fodder as well as health and hygiene were not captured and compiled. In the absence of DMIS, the Government lost the opportunity of maintaining crucial time series data on key indicators, for the State or a particular region, for future planning and preparedness.

The Government replied (August 2024) that information related to Drought relief had been collected from the districts during Kharif Drought 2023 and had been put on a GIS public platform, which is to be further refined.

4.4.1.4 Absence of Standard Operating Procedure

Drought Manual also prescribed preparing/issuing Standard Operating Procedures (SOP) for collection, updation of data related to the drought

variables. Besides, the SDMP also stipulated preparation, regular reviews and improvement of SOPs, protocols, *etc*., which were to complement its plan.

However, in the absence of DMIS coupled with infrequent meetings of CWWG, the required SOPs were not prepared/issued in the State either prior to or after declaration of drought. The drought declaration orders merely included instructions like providing employment under MGNREGS to landless labourers, supply of drinking water, protection of livestock, supply of fodder, *etc*., under SDRF grants.

4.4.2 Drought mitigation measures

Drought mitigation measures are to reduce soil erosion, augment soil moisture, restrict surface run-off of rainwater and improve the efficiency of water use. It involves a wide range of soil and water conservation measures and farm practices. Karnataka experienced a strange situation in 2018. While there was a shortfall of rain in many parts of the State, test-checked southern districts like Dakshina Kannada and Kodagu *etc.*, were affected by heavy rainfall coupled with devastating flood/landslides during August. However, these districts, along with other districts, were declared (December 2018) drought-hit during the Rabi season of the same year.

This is indicative of the fact that the State Government/district administrations did not initiate proper and adequate mitigative measures like water conservation, water harvesting, artificial groundwater recharging activities *etc*., as commented in subsequent paragraphs.

4.4.2.1 Absence of monitoring by the nodal department

Implementing the drought management measures would require a continuous flow of information from the village level to the highest level of decision-making in the State and a responsive administrative structure. The SDMPs prescribe departments to prepare and update a robust database of micro-level details on rainfall, reservoir/ lake water levels, surface water/ ground water, soil moisture, sowing/ crop conditions and socio-economic factors at the end of the South West and North-East monsoons.

However, the nodal department for preparation of information on the SDMP and management of disasters in the State was not in possession of any information regarding activities/measures taken up by the respective department/s [22] and hence, did not provide any information regarding the compliance with NDMA guidelines/manual. The nodal department, thus, did not ensure accountability and did not effectively monitor the activities/initiatives operationalised by other departments towards management of drought in the State. These measures could have gone a long way in reducing the severity of the drought.

[22] Agriculture, Rural Development and Panchayat Raj, Animal husbandry *etc.*

Thus, absence of effective coordination amongst the related departments to initiate necessary drought mitigation measures, led to protracted drought over the years in Karnataka.

4.4.2.2 Absence of a Mission/Task Force

The Drought Manual, 2016 of GoI recommended that the State Government/relief administration should set up a mission/task force for drought mitigation, which would not engage in actual day-to-day drought management but would be a body advising the State Government on policies and programmes. The mission/task force should include experts on water resources, agriculture, forestry and related subjects, senior Government officials dealing with these subjects and NGOs.

Audit observed that, as of 2022-23, the envisaged mission/task force had not been set up in the State for drought mitigation. Consequently, the mandated activities such as analysing the patterns of drought, distribution of impacts across sectors in the State, developing a database on the different indices of drought and suggesting policies and programmes for drought mitigation were not carried out.

In the exit conference, the Government stated (January 2024) that the Task Forces have been formed (November 2023) and strengthened for carrying out envisaged functions like analysis of drought patterns and preparation of database, ensuring water harvesting/conservation initiatives, *etc*.

The Government has given a misleading reply as Audit observed that the Task Force was not at all constituted at the State level as per the Drought Manual which stipulated formation of such a task force for advising on the issues of policies and programmes for drought management. The task force as referred to by the Government was constituted only at the Taluk Level but not at the State level, which is the Audit observation.

4.4.2.3 Inadequate drought risk and vulnerability assessment

The mission/task force on drought mitigation was required to conduct drought risk and vulnerability assessment for the State, which includes identification of drought-prone areas of the State, nature and severity of drought, vulnerable economic sectors, communities and individuals. The assessment was to evaluate the socio-economic cost of drought, by estimating crop losses, decline in dairy production, livestock losses, industrial and energy production losses and the adverse impact on the environment in the State. Such an assessment is important for presenting an economic rationale for interventions and identifying mitigation measures.

Though the data on the drought-prone areas, estimated crop loss and loss of livestock was available with the nodal department, the details of socio-economic factors like decline in dairy production, industrial and energy production losses and the adverse impact on environment in the State had not been evaluated and kept on record.

In the exit conference, the Commissioner, KSDMA stated (January 2024) that the data on socio-economic factors were being collected but not documented and instructions would be issued to document all the relevant factors.

4.4.2.4 Non-engagement of communities/organisations for drought mitigation

Wider the community participation, the greater the public awareness about drought issues and policies/regulations for drought mitigation are likely to be more acceptable in such a situation. The Drought Manual recommended encouraging involvement of different community institutions actively in drought mitigation. Further, the State Government and district administration were to involve NGOs in organizing drought relief. Non-Government Organizations (NGOs) and Civil Society Organizations (CSOs) have the advantage of local presence and community outreach which could be utilized for organizing distribution of relief assistance and implementing mitigation programmes. The State Government and district administration were also required to set up a coordination forum for NGOs and CSOs at the State and district levels respectively.

However, records made available showed that neither the State Government nor the district administrations involved communities, NGOs and CSOs in drought-proofing/mitigation activities. Thus, in the absence of participation by NGOs/CSOs, the Government lost opportunities to augment drought management mitigative measures like alternate cropping, water conservation techniques, *etc*., at the local/regional level.

The Government replied (August 2024) that henceforth communities will be actively involved in drought mitigation and management.

Recommendation 8: The State Government should formulate guidelines for mitigating drought considering geo-spatial climate variations and ensure effective coordination among all the stakeholders in enhancing drought mitigation efforts.

4.4.2.5 Water Harvesting and Conservation

Water harvesting and conservation refer to processes and structures of rainfall and runoff collection from large catchment areas and channelling them for human consumption. Conservation can be attempted through artificial recharge[23] of groundwater, rainwater harvesting and the other traditional methods, which are low-cost, community-oriented and environment-friendly.

However, such beneficial water harvesting and conservation measures were not attempted and adopted entirely in the State, as evident from the fact that test-checked Dakshina Kannada and Kodagu districts which were severely affected by floods were declared drought affected within a span of 3-4 months in the year 2018.

Though the Government enacted amendment to an Act[24] mandating water harvesting, audit observed that the jurisdiction of the Act was limited only to

[23] Soil conservation and artificial recharge structures include contour bunding, contour trenching, contour cultivation, bench terracing, graded bunding, gully plugging, check dams, nalla bunding, percolation tanks, injection wells, *etc.*

[24] Bangalore Water Supply and Sewerage Board Act, 1964 (August 2009).

Bengaluru urban area. Similar action towards water harvesting had not been taken anywhere in the State.

The Government replied (August 2024) that the Departments of Urban Development, RDPR and Water Resources would be requested to look into the matter and take appropriate action in this regard.

4.4.2.6 Artificial recharge of groundwater

Many States have implemented schemes for artificial recharge to groundwater and water conservation through sustainable water management practices viz., Jalyukt Shivar Scheme in Maharashtra, Sujalam Sufalam Jalsanchay Abhiyan in Gujarat, Mukhyamantri Jal Swavlamban Abhiyan in Rajasthan, Mission Kakatiya programme in Telangana *etc*.

However, the State of Karnataka did not formulate any such innovative schemes on artificial recharge to groundwater and water conservation.

Audit observed that the Central Ground Water Board had prepared a conceptual document "Master Plan for Artificial Recharge" which gives the information on areas feasible for recharge, number and type of recharge structures feasible taluk wise. The State Government can use this document to devise pan-Karnataka schemes on artificial recharge and water conservation. However, before construction of any water conservation and artificial recharge structure, site-specific technical feasibility/viability may be checked by technical experts.

4.4.2.7 Laxity in regulation of Groundwater extraction

Groundwater levels are also affected due to over extraction, poor recharge, either due to lack of adequate rainfall or poor water conservation practices. As a result, water availability in borewells and open wells diminishes substantially. Declining groundwater level is the main indicator of probable drought conditions.

The State Government enacted (April 2011) the Karnataka Ground Water (Regulation and Control of Development and Management) Act, 2011 and established (March 2012) the Karnataka Groundwater Authority (KGWA) for the whole of the State. The Act mainly focuses on regulation of ground water in notified areas/blocks. It is pertinent to state that the All India Performance Audit Report of CAG on Ground Water Management and Regulation (Union Report No. 9 of 2021) points to the variation between the Karnataka Act and CGWA guidelines and stresses on uniformity of both. The Act, therefore, needs to be modified and reoriented based on the CGWA guidelines to ensure stringent regulation and control groundwater extraction in Karnataka.

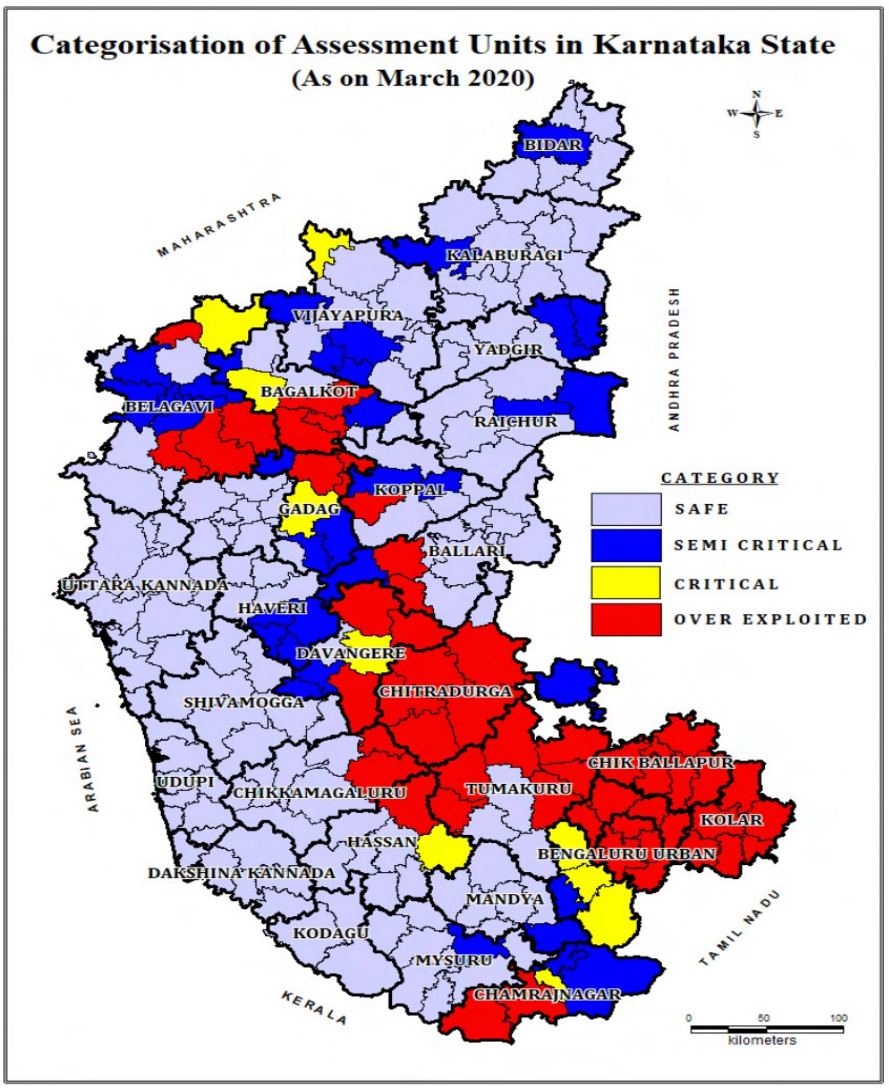
Audit observed that the KGWA could not control inordinate extraction of groundwater, though the State was affected by recurrent drought hazard in as much as it:

- could not control illegal and inordinate extraction of groundwater for commercial purposes through private water tankers;
- Neither possessed the time-series data on the number of borewells in the State nor data on the total number of borewells drilled in the water distressed notified taluks;

- ❖ Did not maintain data on high-rise buildings and groundwater extraction therefrom.
- ❖ Did not adhere to/enforce the norms prescribing a minimum distance of 500 meters between two borewells.

The laxity in groundwater regulation resulted in a persistent increase in notified groundwater distressed taluks from 35 in the year 2012 to 45 in the year 2020 indicating a drift towards the danger of water extinction due to over-exploitation of groundwater. District-wise status of groundwater extraction is shown in **Exhibit 4.2** below.

Exhibit 4.2: District-wise status of groundwater extraction



Source: KSNDMC.

The number of taluks notified as groundwater distressed in the test-checked districts is shown in **Table 4.4** below.

Table 4.4: Groundwater distressed taluks under test-checked districts

District	Number of taluks notified as groundwater distressed			
	2012	2015	2017	2020
Total taluks notified in the State	***35***	***30***	***43***	***45***
Belagavi	4	1	3	3

District	Number of taluks notified as groundwater distressed			
	2012	2015	2017	2020
Chikkaballapur	5	5	5	6
Davanagere	1	1	3	2
Ramanagara	2	1	2	2
Total (% with reference to notified taluks)	**12 (34)**	**8 (27)**	**13 (30)**	**13 (29)**

Source: Triennial data furnished by KGWA.

State Government or the district administrations had not taken effective measures for water conservation/harvesting and prevent over-exploitation of groundwater. Instead, the State/district authorities resorted to drilling borewells in more numbers extracting groundwater besides obtaining water from borewell owners for supply through tankers during drought periods. This further aggravated the stressed groundwater levels.

Lack of preparatory/mitigative measures to conserve available water through various procedures and uncontrolled extraction of groundwater contributed to the severity of drought during the years of poor rainfall.

The State Government stated (August 2024) that the Departments of Urban Development, RDPR and Water Resources would be requested to look into the matter and take appropriate action in this regard.

Recommendation 9: The State Government should emphasise on measures for water conservation and water harvesting along with enforcing regulations on unchecked groundwater extraction.

Laxity in drought mitigation - a Case study of Chikkaballapura district

As discussed in the preceding paragraphs, Chikkaballapura was one of the districts that was always prone to drought hazards. Consequent to over-exploitation of groundwater, all the taluks of the district were notified as groundwater distressed. This required the State Government and district administration to address the needs of the district and mitigate the impact caused by drought. Accordingly, the State Government was required to address the problems in drought prone eastern districts of Chikkaballapur and Kolar, which did not have dedicated water supply schemes, and other needy areas of Hassan, Chitradurga, Tumkur, Ramanagar and Bengaluru Rural Districts. An administrative approval was accorded (February 2014) to divert 24.01 TMC of water from west flowing streams to cater to the drinking water needs and filling of water bodies in these districts. The original project cost of ₹8,323.50 crore as per approved DPR (July 2012) was revised to ₹12,912.36 crore (February 2014) and further revised to ₹23,251.66 crore. The project which was scheduled for completion by 2023-24 remained incomplete as of August 2023 with a total expenditure of ₹14,076.15 crore (financial progress - 60 per cent).

Insofar as the test-checked districts were concerned, the project envisioned providing 5.093 TMC for drinking water and tank filling (Chikkaballapur) and 1.834 TMC for drinking water (Ramanagara). The project was flawed with improper planning, resulting in frequent changes in design/alignment of the project due to non-availability of land and inordinate delay in implementation. The status of items of works proposed and completed in the test-checked districts is shown in ***Table 4.5****.*

Table 4.5: Status of completion of work in test-checked districts

Item of work	Chikkaballapura		Ramanagara	
	As per DPR	Completed	As per DPR	Completed
Length of pipeline (Kms.)	69.87	0	4.50	0.50
Land acquisition (Acre-Guntas)	131.33	0	7.13	0

Source: Information furnished by Visvesvaraya Jala Nigam Limited.

Thus, the objective of providing dedicated drinking water supply to the drought-prone districts was not achieved even after 10 years of commencement of project construction. The completion of the project, therefore, remained a distant dream considering the targeted items of work vis-à-vis the achievement.

4.4.3 Response and relief measures against drought

Drought relief and response measures need to be planned and implemented as soon as the distress signs of drought are visible. It is necessary that these measures are undertaken promptly so that it would mitigate the hardships faced by the people. Though these measures are sector-specific, they require immense inter-departmental coordination.

4.4.3.1 Absence of drought relief measures

Audit observed that while declaring the drought in the State, the districts were generally instructed to initiate measures towards providing employment under Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), drinking water supply, fodder supply and livestock protection, *etc.*, as per the SDRF norms.

The nodal department was not in possession of comprehensive details on any of the above relief measures either for the State as a whole or at the district level, except for funds released for financial compensation towards crop loss. Audit analysis of the data hosted on the official website of MGNREGS disclosed that additional employment provided to distressed rural population during 2018-19[25] was meagre at 2.39 *per cent* of the total registered households in the State. In respect of test-checked districts, the additional employment provided varied between zero and eight.

Details of additional employment provided under MGNREGS in the State and test-checked districts during the drought season of 2018-19 are shown in **Table 4.6** below. While no additional employment was provided to any of the households in the districts of Dakshina Kannada, Kodagu and Shivamogga, it was less than one *per cent* in Belagavi and Haveri districts.

Table 4.6: Details of additional employment provided under MGNREGS in the State and test-checked districts during the drought season(2018-19)

District	Total registered households	Households given employment of 100-150 days	Households given employment of 100-150 days in drought affected areas	Percentage
Belagavi	7,77,607	5,968	5,967	0.77
Chikkaballapura	2,21,327	5,066	5,066	2.29
Dakshina Kannada	1,62,772	902	0	0
Davanagere	2,30,319	9,176	9,176	3.98
Haveri	2,64,324	1,647	1,647	0.62

[25] Only year under the audit period during which State encountered drought.

District	Total registered households	Households given employment of 100-150 days	Households given employment of 100-150 days in drought affected areas	Percentage
Kalaburagi	4,10,512	5,028	5,028	1.22
Kodagu	86,917	402	0	0
Ramanagara	1,97,753	15,163	15,163	7.67
Shivamogga	2,38,908	2,518	0	0
Karnataka	**78,67,647**	**1,98,947**	**1,88,161**	**2.39**

Source: Official website of MGNREGS.

Besides, audit also observed that additional employment of 100-150 days was generally given to registered households during all the years, of which the percentage varied between 1.87 and 3.02 during the years 2019-20 to 2021-22, as shown in the **Table 4.7** below.

Table 4.7: Details of additional employment provided under MGNREGS during non-drought years

District	Percentage of additional employment provided		
	2019-20	2020-21	2021-22
Belagavi	2.37	4.47	5.07
Chikkaballapura	2.92	0.00	0.00
Dakshina Kannada	1.45	1.29	0.00
Davanagere	1.26	3.11	3.30
Haveri	2.43	2.73	5.11
Kalaburagi	1.91	1.61	3.23
Kodagu	1.15	1.08	0.13
Ramanagara	9.20	0.06	0.05
Shivamogga	1.71	1.81	2.05
Karnataka	**2.65**	**3.02**	**1.87**

Source: Official website of MGNREGS.

The Drought Manual issued by the GoI envisaged tax waivers and concessions as measures towards response and relief against drought. However, the State Government did not provide sufficient relief to drought affected population through any sort of tax waivers and concessions like granting remission of land revenue, postponement of the recovery of dues from the farmers towards water, irrigation and electricity charges, or any other dues related to agriculture, converting short-term loans and rescheduling current instalment of medium-term loans, waiving education/examination fees for the students in Government schools located in drought-affected areas, *etc.*

Thus, it can be observed from the tables (4.6 and 4.7) above that additional employment provided during the drought year of 2018-19 to 2021-22 ranged between 1.87 and 3.02 percentage.

The State Government stated (August 2024) in the context of waivers and concessions that it has ensured restructuring of eligible farmer loans as per RBI master direction on relief measures.

Recommendation 10: The State Government should conduct a comprehensive water audit to address demand-supply gaps as part of the mitigation measures and make it mandatory to conduct borewell census at periodic intervals.

Chapter - V

Flood and rain hazard

CHAPTER V

Flood and rain hazard

Karnataka, although primarily a drought-prone state, has recently experienced severe flooding due to erratic climate conditions, resulting in significant losses. This chapter highlights deficiencies in flood risk management, particularly in KSNDMC projects, focusing on preparedness and compensation for damages.

The 2021 Karnataka State Action Plan for Flood Risk Management missed key elements such as community-level planning and flood-proofing measures. The lack of floodplain zoning regulations, despite available hazard maps, underscores a critical gap in risk mitigation. Additionally, non-compliance with NDMA guidelines revealed a lack of essential legal frameworks and documentation.

Structural mitigation efforts have largely been neglected, and non-structural measures suffered from insufficient institutional support and law enforcement, as illustrated by cases in Belagavi and Shivamogga. Authorities did not conduct safety audits and retrofit buildings, prioritizing financial compensation for damages over disaster resilience, which also lacked comprehensive guidelines and validation measures.

Floods and rain hazards are closely related, as floods are a consequence of rain hazards. Flooding can also be caused by the overflowing of rivers, lakes, or seas, based on which, can be differentiated as flash flooding, riverine flooding, coastal flooding, urban flooding, groundwater flooding, *etc*.

Frequent floods from rivers and lands getting covered with water due to heavy rain are common disasters in the State of Karnataka causing damage to public structures and private properties.

5.1 Karnataka State Flood Profile

Karnataka has encountered severe flooding mainly in the Krishna and Cauvery River basins during the monsoon season, resulting in substantial loss and damage to human life, property, crops, and essential infrastructure. This phenomenon has been primarily attributed to the occurrence of intense to very heavy rainfall, leading to substantial inflows into the rivers and its upstream tributaries. Consequently, these augmented water volumes have exerted considerable pressure on the reservoirs within the State, culminating in the inundation of low-lying regions and the extensive submergence of agricultural land situated along river and canal courses.

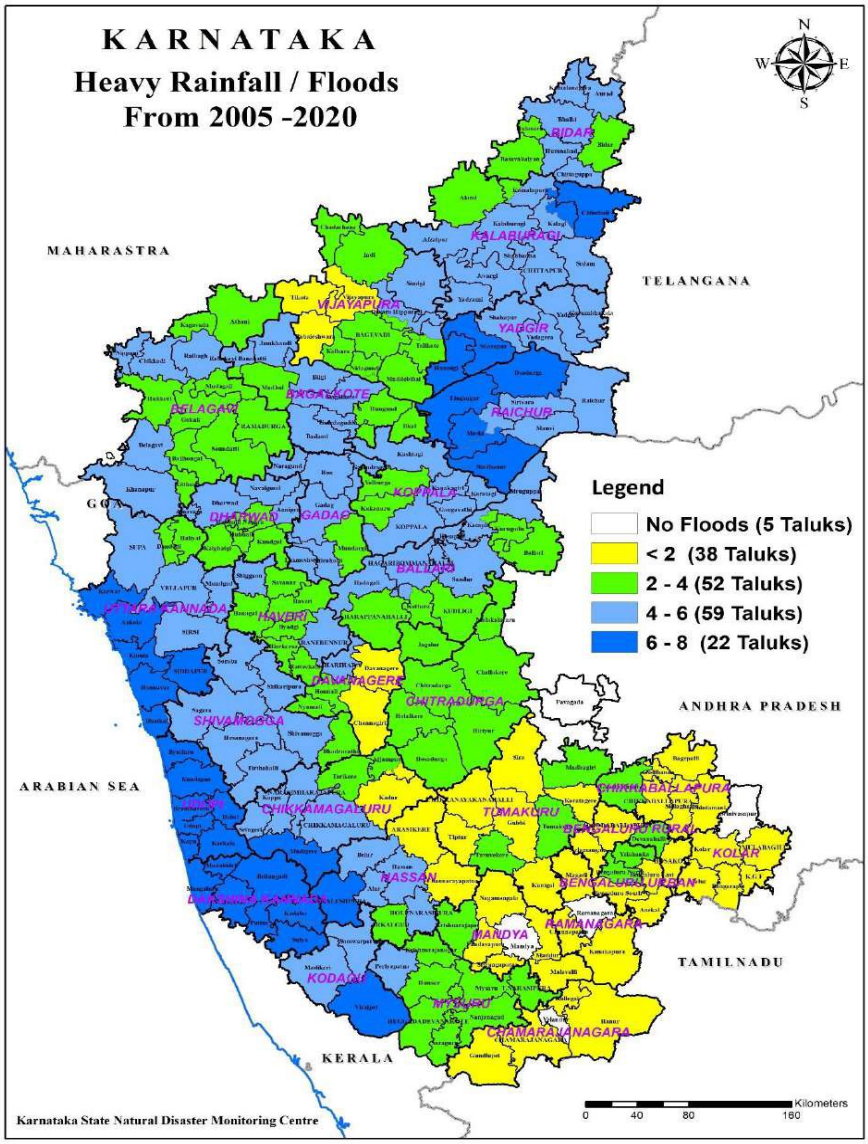
5.1.1 Regional distribution of rainfall in the State

The rainfall in Karnataka has been distributed into three seasons *viz.*, pre-monsoon (January to May), south-west monsoon (June to September) and north-east monsoon (October to December).The south-west monsoon plays a dominant role contributing more than 70 *per cen*t of the annual rainfall. The annual rainfall ranges from less than 500 mm (North Interior Karnataka) to more than 4000 mm (Western Ghats and coastal Karnataka), averaging to about 1,150 mm distributed over 40 to 100 rainy days in a year.

Because of the varying rainfall distribution, many a time, areas which were not traditionally prone to floods also experienced severe inundation. Areas with poor drainage facilities get flooded by accumulation of water from even moderate

rainfall. The flood frequency of the State during the period 2005-2020 is shown in **Exhibit 5.1** below.

Exhibit 5.1: Map showing the flood frequency of the State during the period 2005-2020



Source: KSNDMC

Karnataka has experienced eight years[26] of flood hazards including consecutive floods from 2018 to 2022 in the last ten years. The year-wise details of flood/heavy rain incidents under the test-checked districts during the period 2018-2022[27] are shown in **Table 5.1.**

Table 5.1: Year-wise details of flood/heavy rain incidents under the test-checked districts

District	Calendar year of flood impact
Belagavi	2019, 2020, 2021 and 2022
Chikkaballapura	2021 and 2022
Dakshina Kannada	2018, 2019, 2020, 2021 and 2022
Davanagere	2019, 2020, 2021 and 2022

[26] State experienced both drought and floods during 2018 and 2019.

[27] Year 2022 was not declared as calamity affected by the State Government, though encountered flood hazard.

District	Calendar year of flood impact
Haveri	2019, 2020, 2021 and 2022
Kalaburagi	2019, 2020, 2021 and 2022
Kodagu	2018, 2019, 2020, 2021 and 2022
Ramanagara	2021 and 2022
Shivamogga	2018, 2019, 2020, 2021 and 2022

Source: Data furnished by the Revenue Department (Disaster Management)

5.1.2 Impact and estimated loss

Apart from enormous damage to agriculture/horticulture sector and infrastructure, the floods also lead to loss of human and cattle life. The assessment of potential losses resulting from floods constitutes a significant aspect of risk evaluation and disaster preparedness. The total estimated loss under the test-checked districts due to floods during the audit period is shown in **Table 5.2**.

Table 5.2: Estimated loss under the test-checked districts due to flood between the years 2019-2022

(₹ in crore)

Name of the district	2019	2020	2021	2022
Belagavi	17,835.50	2,283.73	2,182.84	952.30
Chikkaballapura	0	0	748.33	542.43
Dakshina Kannada	1,088.28	209.65	102.11	431.80
Davanagere	18.80	31.99	309.93	427.93
Haveri	2,720.64	602.27	1,222.02	208.51
Kalburgi	328.80	4,981.10	626.42	285.96
Kodagu	312.43	1,128.82	1,072.83	228.55
Ramanagara	0	0	372.90	287.51
Shivamogga	1,091.65	208.49	646.74	45.70
Total	**23,396.1**	**9,446.05**	**7,284.12**	**3,410.69**

Source: Data furnished by the nodal department

Data pertaining to the year 2018 was not furnished by the nodal department.

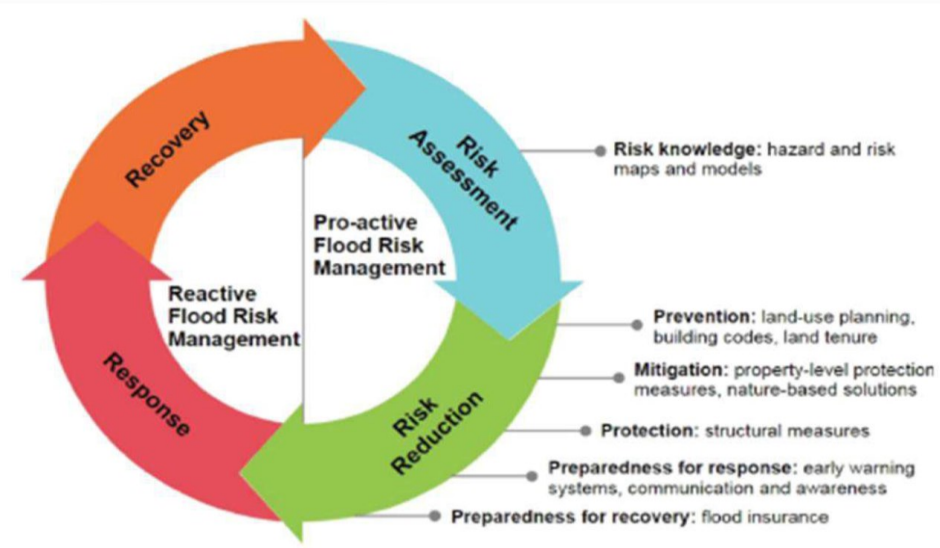
The total estimated loss of infrastructure and crops in the State due to floods during the audit period was to the tune of ₹97,814.77 crore. The component-wise details are shown in **Appendix 5.1**.

5.2 Flood Risk Management

Flood Risk Management (FRM) necessitates an ongoing process of adaptation, aiming to manage flood risk, reduce community vulnerability, and expedite post-flood recovery consistently and effectively. Flood risk reduction is a systematic approach to identify, assess and reduce the risks of disasters.

A pragmatic flood risk management cycle is shown in **Chart 5.1**.

Chart 5.1: Flood risk management cycle



Source: Karnataka State Action Plan for Flood Risk Management

5.3 Preparedness towards Flood Risk Reduction

5.3.1 Flood management framework – deficient State Action Plan

The NDMA brought out (January 2008) the guidelines for Management of Floods. In accordance with Section 9.3 of the guidelines, all State Governments/SDMAs were to prepare the Flood Management Plans (FMPs) in accordance with these guidelines. The State Government, however, inordinately delayed the preparation of FMP for the State and brought out the 'Karnataka State Action Plan for Flood Risk Management' only during the year 2021.

The salient activities to be covered in the FMPs were to include identification of flood prone areas, preparation of flood vulnerability/flood risk/ flood hazard maps, and improvement of drainage, developing guidelines for flood-proofing measures for all existing critical lifeline structures and major public buildings in a phased manner.

Besides, NDMA provided for preparation of FMPs by schools, hospitals, industries, entertainment houses, major shopping complexes *etc*., in flood prone areas and carrying out mock drills for enhancing preparedness. The State Plan, however, did not provide for preparation of FMPs by any of these agencies/institutions. Guidelines for flood proofing measures were not prepared. The State Plan did not stipulate the important milestones for implementation of various activities spelt out in the plan and thus the implementation of the Action plan was not time-bound. Thus, the State Plan did not comply with the provisions of the national guidelines and did not adequately address the issues relating to flood management.

The Government replied (August 2024) that the FRM action plan had been formulated by KSNDMC. However, supporting documentation was not furnished to Audit.

5.3.2 Absence of institutional initiatives

As per the NDMA guidelines, the Government of India has taken a number of initiatives in the field of flood management and appointed many committees/ working groups/task forces from time to time to look into the problem of floods

and suggest remedial measures for their management. It has also issued a number of policy statements in this regard.

Though it is mentioned in the State Flood Action Plan as 'State Government had appointed many committees/working groups/task forces', the details of the said institutional support for flood management were either not mentioned in the Action Plan or not furnished to audit. Audit hence is unable to assess the efficacy of implementation of initiatives proposed, if any.

5.3.3 Deficient weather forecast mechanism

Flood forecasting and warning mechanisms are the primary and crucial non-structural measures in flood management. A robust early warning system was to comprise installation of field monitoring sensors – for weather, geological, hydrological parameters; collection/analysis of data in real-time; simulation through appropriate mathematical models; customized report generation; and dissemination of the alerts/reports/advisories to the users.

Audit observed that the forecast and early warning alert mechanism for flood, though established in the State by incurring substantial expenditure towards installation of TRGs and TWSs through KSNDMC, was marred by inaccurate reporting due to non-/malfunctioning of the equipment (commented under Paragraph 4.3.2.1 previously).

Audit also observed serious omissions in implementation of various projects taken up by KSNDMC towards flood warning/management activities which facilitated lapses in flood management in the State. Details of the projects and deficiencies thereon are discussed in successive paragraphs.

5.3.3.1 Non-implementation of Real-time Decision Support System for Flood Early Warning and consequent non-preparation of hydrological flood model

As large parts of the State were recurrently affected by floods, the KSNDMC proposed (January 2021) to implement 'Realtime Decision Support System for Flood Early Warning' in Krishna River basin under the component of preparedness and capacity building. The project involved:

- Installation of radar stream gauges and reservoir level sensors;
- Data collection and analysis;
- Dissemination of early warning and advisories to all the stakeholders; and
- Developing state-of-the-art modelling tools for flood forecasting and inundation mapping compatible with GIS environment.

KSNDMC entrusted (July 2021) the work to a firm[28] at a project cost of ₹2.57 crore. The work comprised installation and commissioning of six water level sensors (at reservoirs) and stream gauge sensors with velocity meter sensors (nine numbers) at different locations, within a period of 120 days, including comprehensive annual maintenance contract (CAMC) for a period of four years. As of December 2023, a total payment of ₹2.45 crore was made to the agency.

Verification of records disclosed that :

- Technical specifications of the installed equipment had not been checked, verified and certified by any of the technical personnel of KSNDMC, prior to commissioning;

[28] M/s. MOSERP Technologies India Private Limited, Bengaluru.

- As per the work order, the KSNDMC was required to provide the server, static IP to the server for receiving data from these instruments. Details on KSNDMC providing the Server or the Static IP are not on record. Further, KSNDMC was not in possession of date-wise data of the water levels/velocity captured by any of these sensors;

  This is an impediment for monitoring water levels and the objective of the system installed was not achieved;
- Each radar stream gauge was to be calibrated by the vendor once every six months, duly submitting the calibration certificate to KSNDMC. However, neither details of calibration nor the certificates thereon were on record;
- As per the Service Level Conditions, the vendor was responsible for keeping the equipment in good condition during the warranty/CAMC period of four years.
- Audit verified the online functioning of these sensors and noticed (December 2023) that, six out of the installed 15 sensors were non-functional and hence, data was not being captured from these equipment.

  Director, KSNDMC admitted (December 2023) that 8 out of the 24 equipment (gauges/sensors) installed under the project were non-functional.

Thus, in the absence of basic data, the State Government/KSNDMC could not create the envisaged hydrological models for flood forecasting in the State/region. Thus, the investment of ₹2.45 crore on the sensors and stream gauge monitors was rendered largely unfruitful.

Further, KSNDMC was not in possession of documents like original invoice of procurement, warranty card and user guide/manual of these installed equipment. Thus, absence of original documents coupled with the gauges/sensors becoming non-functional within the maintenance period, raises doubts on the genuineness of equipment installed under the project.

The Director, KSNDMC stated (December 2023) that penalty would be levied as per the tender clause in respect of non-functioning equipment. Thus, it is evident that data on water levels was not available for creation of an envisaged model for flood forecasting.

5.3.3.2 Centralised Wireless public broadcasting at vulnerable GPs– Unfruitful expenditure of ₹1.09 crore due to under performance

The project of 'Centralised Wireless public broadcasting at vulnerable GPs' was proposed by KSNDMC, as a pilot project, in January 2021 and the same was approved by SEC in February 2021 at a cost of ₹1.14 crore.

The project envisaged covering 104 GPs under the districts of Belagavi, Bagalkot and Raichur districts, wherein it was planned to disseminate flood alert early warning messages centrally from the control room at KSNDMC. The contract for installation of required equipment and commissioning was entrusted (June 2021) to two firms[29] with a stipulation to complete the work within three months. As of December 2023, a total payment of ₹1.09 crore was paid to the firms.

Test-check of alert message-log *vis-à-vis* success/published data disclosed that the project was under-performing as sent messages had not reached all the intended GPs in many instances due to non-availability of system/network. Hence, the purpose of installing the equipment at grassroots level for alerting endangered

[29] M/s. Protronics Technologies – 89 GPs and M/s. Sumukha Technologies and Software Pvt Ltd – 15 GPs.

population from flood early warning through a wireless broadcasting system at a cost of ₹1.09 crore was not achieved.

The Director, KSNDMC replied (July 2024) that to curtail the failure of the announcements due to non-availability of network, new sim cards were being provided free of cost to the service provider for replacement based on the ISP with better signal strength in the Grama Panchayat. It further stated that as Grama Panchayat building construction is underway at some places, the instruments would be relocated/reinstalled on completion of the construction activity and at some places power failure issues were reported for which the Grama Panchayat officials have been informed not to turn off the power supply provided to the system. However, the details of success rate of messages sent subsequently after replacement of sim cards were not furnished to audit. Hence, audit could not ensure the status of functioning of the project. The project lagged due to failure in ensuring suitable network connectivity which should have been checked at the initial stage itself.

5.3.3.3 Wasteful expenditure on preparation of urban flood model for Bengaluru

Department of Science and Technology funded the work 'Preparation of urban flood model for Bengaluru'. KSNDMC was entrusted (March 2019) with implementation of the project. The total project outlay was ₹2.30 crore. A total sum of ₹1.74 crore was released during the years 2018-19 and 2019-20. The scope of the work *inter alia* included installation of 25 TWSs and 04 ultrasonic water level sensors in BBMP limits at a cost of ₹16.69 lakh. As of December 2023, audit observed that a total expenditure of ₹1.61 crore had been incurred (90 *per cent* of the expenditure towards salaries) on the project.

Audit observed that KSNDMC, despite being the implementing and monitoring agency, did not possess either the details of location of installation of equipment or the data obtained through the equipment since installation. Thus, while ₹1.61 crore has been expended on salaries, the preparation of the flood forecast alert model is absent. The reasons for this lapse are to be investigated.

5.3.3.4 Non-functional water level sensors installed on stormwater drains in Bengaluru

(a) KSNDMC took up (March 2021) the project "Strengthening the flood early warning system of BBMP through installing water level sensors (WLS)" at an outlay of ₹2.36 crore out of SDRF grants. The project included installation of 105 water level sensors (100 on storm water drains and five in flood vulnerable streets) at different locations at a cost of ₹1.03 crore.

Audit scrutiny of records showed that the work order was issued during July 2021 and the firm completed (January 2022) the installation and was paid ₹0.98 crore (annual maintenance charges to be paid accordingly for five years). Audit verification (December 2023) revealed that 49 out of 100 WLS installed on storm water drains were non-functional and no information/data was available in respect of five WLS reportedly installed at flood vulnerable streets. This affected the objective of strengthening the flood early warning system besides rendering the expenditure (incurred out of SDRF grants) on non-functional WLS unfruitful.

The Director, KSNDMC replied (December 2023) that in the absence of watch and ward, some of the installed WLS were removed by BBMP and a few were stolen.

Audit further observed that KSNDMC had procured a total of 25 large display (65 inches) television sets (TVs) at a cost of ₹32.66 lakh under this project for displaying the water level status of storm water drains. Audit verification revealed that three TVs were given to corporations of smart cities[30], six to DCs of smart cities[31], two were installed in the chamber of Commissioner, KSDMA and four TVs were being used at KSNDMC and the remaining 10 TV units were lying idle rendering the expenditure of ₹13.06 lakh unfruitful. Reasons for supplying the display units to other smart cities while the project was meant for Bengaluru/BBMP were not forthcoming from the records.

Director, KSNDMC stated (December 2023) that eight display units would be installed in BBMP after development of a new web portal for Bengaluru smart city and a letter has been addressed to BBMP for provision of space and other required infrastructure.

(b) Audit observed that KSNDMC had implemented (February 2022) the work of Supply, installation, commissioning and maintenance of Telemetric Rain Gauge (75), Telemetric Weather Stations (29), Telemetric Water Level sensors (50) and IP cameras (30) under smart cities of Mangaluru, Belagavi and Hubballi-Dharwad at a total cost of ₹1.45 crore. Scrutiny of records revealed that 69 out of these 184 equipment were non-functional (December 2023).

Director, KSNDMC accepted (December 2023) that the equipment was not functioning but did not spell out action taken for rectification of defects and making them functional to achieve the intended objective of creation of disaster resilient smart cities.

This highlights the negligence of KSNDMC authorities in (i) execution of projects, (ii) maintenance of equipment installed, and (iii) non-obtaining envisaged data from this equipment. Besides, sanctioning/release of funds under SDRF by SEC/Revenue Department for disaster management activities without monitoring the implementation of these projects and achieving anticipated results is a pointer to indifference and apathy towards the project. The objective of better disaster management and disaster risk reduction stood affected on this account. Resultantly, the population of the State continued to suffer year after year without a comprehensive forecast alert mechanism against flooding.

On the above omissions in functioning of KSNDMC, the State Government did not offer issue-wise remarks but replied (August 2024) that some of the equipment were non-functional due to expiry of AMC, for which action is being taken to invite tenders and all the omissions would be rectified.

However, the Government had not taken timely action though the AMC of the equipment had expired commencing from 2022 and water level sensors were defunct even within the AMC period. Reply of the Government is silent on the issues of physical absence of large number of sensors installed under BBMP jurisdiction despite incurring expenditure under SDRF grants.

Recommendation 11: The State Government should ensure proper functioning of weather forecasting mechanisms/equipment and fix responsibility for improper project/scheme implementation.

[30] Belagavi, Hubballi-Dharwad, Mangaluru.
[31] Belagavi, Davanagere, Hubballi-Dharwad, Mangaluru, Shivamogga, Tumakuru.

5.3.4 Deficient floodplain zone mapping

Disaster risk reduction frameworks envisage key themes encompassing risk reduction strategies such as early warning systems, community education, enhanced building codes, land use planning, and public participation in DRR. The DM Act and DM Policy similarly stressed a transformative shift towards proactive disaster management, with a focus on long-term DRR initiatives.

Assessment of flood hazard is the basic requirement in management of the disaster. Flood zonation maps were to be created by considering various relevant factors like rainfall and climate, size of basin, land slope and aspect ratio, gradient of stream networks, drainage density, land use and land cover, soil type, infrastructure, *etc*., along with their significance. These hazard zonation maps will facilitate decision-makers to formulate an efficient flood zonation plan for mitigating disaster risk reduction.

Audit observed from records made available that the State had prepared flood hazard zoning maps for each of the river basins (as part action plan for flood risk management) and identified villages prone to floods. However, such vulnerability mapping was not done for the plain areas which were not covered under river flow paths but were affected by water inundation due to heavy rainfall.

The Government replied (August 2024) that flood zonation maps were formulated in consultation with the Water Resources Department and the Central Water Commission and the same would be strengthened.

5.3.5 Absence of floodplain zoning regulations

Floodplain zoning further requires laying down limitations on development of both the unprotected as well as protected areas. The State Action Plan envisaged enactment and enforcement of appropriate laws for implementing floodplain zoning regulations like eviction of encroachment into the waterways and natural drainage lines, restriction of unplanned growth, incorporation of specific provisions[32] to the building by-laws, *etc*. The Ministry of Water Resources and Central Water Commission had circulated a draft bill on floodplain zoning way back in the year 1975 and various committees/task forces/working groups *etc.*, have also recommended the same.

However, the State was yet to frame and enact the Floodplain Zoning Regulations and thus, encroached inhabitation, unplanned growth, *etc*., along waterways were not regulated in the State despite people being affected repeatedly by floods and compensations being paid.

Recommendation 12: The State Government should take immediate measures to prepare floodplain zoning of all vulnerable locations and should enact regulations thereon. It also should contemplate shifting of villages persistently affected by floods to safer elevations to avoid recurrent damage as well as recurrent expenditure towards compensation.

[32] Plinth levels of all buildings to be 0.6 m above the drainage/flood submersion lines, all the buildings to be preferably double and multiple storeys in the areas liable to floods, *etc*.

5.4 Mitigation Measures Against Flood Hazard

5.4.1 Non-compliance to the provisions of NDMA guidelines

As per constitutional provisions, flood management is a State subject and as such the primary responsibility for flood management lies with the States. The role of the Central Government is advisory, catalytic and promotional in nature. The States have to investigate, plan, construct, maintain and operate all flood management works. In this direction, NDMA guidelines stipulated certain provisions to be complied with by the State Government. However, the authorities at State Government did not comply with such provisions, which resulted in flawed management against flood hazard in the State. Omissions to NDMA provisions and their impact are illustratively discussed below.

❖ **Legal framework for making infrastructure flood resilient**

It is stipulated that infrastructural activities by different organisations such as the National Highway Authority of India (NHAI), the State Public Works Department, other departments, *etc*., in the flood prone areas need to be carried out duly considering the requirements for making them flood resilient. While constructing highway lines and roads, due care has to be taken in aligning, locating and designing with respect to height and width of embankments and providing adequate waterways i.e., bridges, culverts, vents and causeways for passage of storm water.

Despite mentioning the requirement of legal framework in its Flood Action Plan, the State did not establish a legal framework for obtaining mandatory clearances by agencies for construction of public infrastructure in flood-prone areas which resulted in National/State highways, railways and other roads getting flooded/ inundated repeatedly without arrangement for passage of storm water.

Photographs of public infrastructure flooded with rainwater in different parts of the State are shown as **Exhibit 5.2.**

Exhibit 5.2 Photos of public spaces inundated with floods

Bengaluru-Mysuru Express Way

Belagavi-Kolhapur Highway

School building in Ramanagara district

Railway track in Dakshina Kannada

Source: Media Reports.

❖ Regulation of inhabitations in low-lying areas

As a preventive measure, the inhabitations in the low-lying areas along the rivers, canals and drains were to be regulated by the State Government/SDMA/DDMAs. However, none of the authorities regulated such inhabitations as evidenced in audit in the test-checked districts of Belagavi, Dakshina Kannada, Davanagere, Shivamogga, *etc*., where the authorities operated '*Kalaji Kendras (*Relief Centres*)*' to accommodate population living along the banks of river/canal (passing through the towns) affected due to increase in the water level till it receded and also financially compensated for inundation of houses as per norms.

Illustration: Non-relocation of flood prone families in Belagavi district

The villages in Belagavi district were prone to riverine floods due to their location on the banks of various rivers such as Krishna, Doodhganga, Ghataprabha, Malaprabha, Hiranyakesi and Markandeya. Due to release of excess water from dams upstream, the number of villages as indicated in ***Table 5.3*** *were recurrently affected by floods and the district/taluk authorities were providing temporary rescue and relief measures by shifting the victims to Kalaji kendras (relief centres) till the flood recedes and providing compensation for house damages.*

Table 5.3: Details of villages prone to recurrent floods

Sl.No	Name of the taluk	Number of villages	No of families	Population at risk	Livestock at risk
1	Athani	24	21,858	1,11,888	67,283
2	Khagwada	13	24,019	43,597	51,730
3	Chikkodi	11	34,910	1,15,461	42,939
4	Nippani	23	26,890	1,25,219	1,10,320
5	Raibagh	15	15,050	1,28,296	65,213
6	Khanapur	05	808	3,028	541
7	Hukkeri	26	1,758	8,020	2,744
8	Belagavi	06	2,768	41,187	2,779
9	Gokak	29	31,393	1,62,714	34,875
10	Mudalagi	14	12,692	71,395	68,719
11	Ramadurg	32	24,107	1,09,228	63,565
12	Savadatti	11	11,990	83,229	21,091
	Total	**209**	**2,08,243**	**10,03,262**	**5,31,799**

Source: Information furnished by the department

Despite the fact that more than 10 lakh people and 5.32 lakh livestock were at risk, the State Government/district administration did not take necessary action to relocate recurrently affected families to safer places. This resulted in regular periodical flooding affecting villages enroute, with regular compensation given towards damages.

❖ Absence of timelines and priorities

The State Governments/SDMAs were to evolve datelines and priorities for carrying out detailed hydrological and morphological studies regarding the circumstances, in which embankments/flood walls/flood levees will be constructed for prevention of flooding.

However, neither the SDM Policy nor the annual DMPs of the State and Districts had prioritised and fixed definite timeframe for taking up/completion of works towards construction of embankments/flood walls/flood levees towards ensuring prevention of flood hazards, resulting in instances of same localities being affected with recurrent floods causing significant damage.

❖ **Non-creation of temporary storage of floodwaters**

The State Government/SDMA was to study the availability of natural depressions, swamps and lakes in the vicinity of the rivers and wherever required and feasible, utilise them for temporary storage of floodwaters.

As audit observed, all the districts including the test-checked districts were invariably affected by heavy rainfall and consequent flooding causing substantial damage to houses/infrastructure. However, the annual DMPs of the State and Districts did not contain any proposal ensuring availability of natural depressions along the overspreading rivers/canals in the State to initiate action to utilise available space for temporary storage of water during floods. The absence of detention basins, which if available could have been preventive measures, facilitated spreading of water/inundation of agricultural fields and consequent loss of grown crops in the fields, which are financially compensated.

❖ **Absence of State Flood Control Board**

Taking a serious note of flooding in the country, the GoI established the Central Flood Control Board in the year 1954 which is responsible to lay down general principles and policies in connection with flood control measures, to consider and approve master plans for flood control submitted by the states/river commission, and to arrange for necessary assistance in connection with planning and execution of flood control works.

However, despite the State being affected with recurrent floods causing damage to human life and infrastructure, the State Government had not put in place the State Flood Control Board/Technical Advisory Committee, in line with the Central Government.

As regards non-compliance with NDMA norms discussed above, the Government replied (August 2024) that the departments concerned would be urged to strictly implement the regulations in flood prone areas. This is indicative of the lack of effective cooperation among stakeholder departments besides laxity in regulation and monitoring by KSDMA/the nodal department towards disaster management activities, resulting in non-compliance to NDMA stipulations.

5.4.2 Absence of structural and non-structural measures

Protecting flood-prone areas against all return probabilities of floods is neither economically viable nor practically possible. However, in order to provide a reasonable degree of protection against flood damages, a pragmatic approach was needed through a combination of structural[33] and non-structural[34] measures.

The State Government/KSDMA did not comply with the provisions of NDMA guidelines towards prioritisation of Structures which specified that defence installations, industries, public utilities like hospitals, electricity installations, water supply, telephone exchanges, aerodromes, railway stations, commercial centres, *etc*., were to be in such a manner that they are above the levels corresponding to a 100-year frequency or the maximum observed flood levels. As a result, flooding/inundation of public/private properties was a common feature

[33] Building storages/reservoirs across the rivers, protective embankments along the riverbanks, channelisation of rivers, drainage improvement, diversion of flood waters, watershed management *etc*.

[34] Bioengineering based bank protection measures, vulnerability linked relocation, flood forecasting, floodplain zoning, restrictive land use legislations and policies in floodplains, creating awareness, *etc*.

every time. Photographs of public utilities drowned in flood waters due to absence of prioritisation of structures are shown in **Exhibit 5.3** below.

Exhibit 5.3: Photographs showing inundated public utility structures

Mangaluru floods - 2019

A commercial complex in Belagavi - 2019

Source: Media Reports.

Thus, due to the absence of adequate protective measures, all of the nine test-checked districts were affected by the flood hazard, either riverine or by heavy rain, including Chikkaballapura and Ramanagara which are generally not flood vulnerable districts as shown in **Table 5.1**.

Illustration: Improper drainage system leading to flooding of houses in Shivamogga district

The DDMP of Shivamogga district had identified a list of colonies in Shivamogga town that were prone to inundation. These colonies were situated on the banks of Tunga River. The Audit team conducted (18 January 2023) a joint physical inspection of the Upper Tunga Dam in Gajanur and noticed that the inundation of these colonies was not due to release of excess water from the dam but was due to reverse influx of drainage water that was being released to the left bank canal of the dam. The Assistant Executive Engineer who was part of the inspection stated that during the rainy season whenever there is an increase in water levels, the drainage water flows back to the houses and nearby fields due to non-availability of outflow path.

Scrutiny of records showed that the Karnataka Neeravari Nigam Limited had addressed several letters to the Commissioner of Shivamogga City Corporation and also to the Principal Secretary, Director of Municipal Administration, DC, Shivamogga, Chief Executive Officer, Zilla Panchayat, Shivamogga since 2016 onwards. However, no action was taken to set right the lacuna in the drainage system. The correspondence also highlighted the extreme need for creating an alternate arrangement for drainage flow to avoid not only the inundation but also to safeguard the inhabitants from water contamination and related health hazards.

The above illustration indicates the inability of the district administration to take corrective structural measures and make the district better disaster resilient.

Undertaking necessary structural measures, which consist of various physical infrastructure and facilities required to help communities cope with disasters, was one of the components of FRM aimed at enhancing resilience to flood hazards. Audit observed that though the State was recurrently affected by floods either riverine or by rainwater inundation, the State Government and the district administration had not initiated necessary permanent structural measures to mitigate the impact of the flood menace. Photographs showing the damage caused by floods are shown in **Exhibit 5.4**.

Exhibit 5.4: Photographs showing the damage caused by the floods in test-checked districts due to the absence of structural measures

Belagavi – 2019

Kalaburagi – 2020

Chikkaballapura – 2019

Dakshina Kannada – 2022

Source: Media reports.

The Deputy Commissioners of Dakshina Kannada, Davanagere and Kodagu districts replied that structural measures were not taken up and affected population/communities were financially compensated towards the damages caused. The reply is indicative of the fact that the authorities were not adequately inclined towards disaster risk reduction measures to avoid/mitigate the ill-effects of hazards.

The Government replied (August 2024) that the departments concerned would be urged to undertake suitable structural and non-structural mitigation measures.

Recommendation 13: The State Government should implement structural and non-structural measures by involving all line departments to mitigate recurrent floods and reduce damage to public infrastructure.

5.4.2.1 Non-involvement of line departments

Audit observed that both the SDMP as well as the State Action Plan for Flood Risk Management 2021 assigned certain additional responsibilities (under various themes) to the departments like Public Works Department, Rural Development and Panchayat Raj, Housing, Urban Development, Water Resources Department, *etc*., for taking up structural and non-structural measures as mitigative action against flood in the State. The structural measures included works like assessing vulnerability and taking up necessary action for strengthening roads/ highways/expressways by implementing DRR measures, construction of multi-purpose shelters, identification of sites for flood resistant constructions, designing critical infrastructure duly assessing the high flood levels/flood frequency, strengthening the existing critical infrastructure through retrofitting, *etc*. The non-structural measures involved measures like regulation and enforcement of

laws/norms, wetland conservation and restoration, catchment area treatment, promoting private participation in disaster management projects, *etc*.

During the course of audit, documentation was not available to indicate the involvement of the Revenue Department (Disaster Management) with the line departments regarding preparation of Flood Action Plan or SDMPs. Besides, the nodal department had not communicated the Flood Action Plan to any of the departments for initiating required action on assigned responsibilities. Consequently, neither the State Government/departments nor the district administrations had initiated proper measures towards any sort of structural/non-structural flood mitigative measures, and thus, exposed the State to unceasing distress.

The Government, during the exit conference, acknowledged the observations and stated that issues would be looked into, and action would be taken to comply with the NDMA guidelines and replied (August 2024) that the departments concerned would be urged to strictly implement regulations in flood prone area. However, the need for structural and non-structural measures in sync with the line departments need to be prioritized.

5.4.3 Absence of Safety Audit

Damage to houses and infrastructure is one of the major destructions caused by the floods invariably across the State and the State Government was compensating towards damage of houses after the hazard had occurred. Despite compensating for damages due to disasters, the authorities did not insist on/ensure construction of disaster resilient houses by the beneficiaries.

Audit observed that the SDMPs mentioned about the safety audit of infrastructure only against the hazards of earthquake and tsunami. However, a large number of houses and infrastructure in the State were being affected by floods and consequent landslides. Thus, safety audit of houses and infrastructure in districts vulnerable to flood would lead to taking up disaster resilient retrofitting and rectification actions timely besides avoiding loss and risk to property. Safety audit would also minimise substantial financial burden towards payment of compensation.

The Government accepted (January 2024) during exit conference the concept of a safety audit of houses which can avoid/minimise damage to houses as well as expenditure towards payment of compensation.

5.5 Relief towards Flood/Rain Damage

The global and national frameworks advocated drifting towards disaster risk reduction from the earlier relief-centric concept, which benefits the Government by not only reducing continued financial burden but also by leaping towards building disaster resilience while minimising damage to infrastructure and human lives.

Audit observed that instead of initiating/exploring measures towards efficient DRR, the Government persisted in compensating the flood-affected population financially as per NDRF/SDRF norms and extending additional assistance from State funds. Compensation towards damage to houses and crop loss (input subsidy) *inter alia,* comprised the major fraction of financial assistance extended to flood/rain-affected population.

Lacunae noticed in the provision of relief assistance to the flood/rain affected population in the State and test-checked districts are discussed in subsequent paragraphs.

5.5.1 Non-maintenance of incident-wise data of expenditure

For better management of disasters and to mitigate the related issues, Government was required to implement robust data management practices, ensuring that incidence-wise expenditure data is maintained, regularly updated and reviewed. This would also benefit the Government/decision makers to assess the magnitude of the disaster *vis-à-vis* expenditure booked by the ground authorities besides planning better management.

However, the State Government/nodal department was not in possession of the details of either incident-wise or disaster-wise expenditure. Hence, audit could not assess and vouch for component-wise expenditure towards flood compensation.

5.5.2 Compensation towards house damage

SDRF norms prescribed (April 2015) compensation to be paid under two categories for damage caused to the building *i.e.*, (i) fully damaged/ destroyed and severely damaged houses and (ii) partially damaged houses. The beneficiary was eligible for compensation only if the damage was at least 15 *per cent*. The State Government, however, categorised damage into four types as shown in **Table 5.4.**

Table 5.4: Categorisation of damage and compensation thereon

(Amount in ₹)

Category		Categorization based on the extent of damage	Compensation as per SDRF/NDRF norms	Additional assistance by State Government	Total compensation paid
A		Fully damaged – more than 75 *per cent*	95,100	4,04,900	5,00,000
B	B2	Severe damage - (reconstruction) 25 to 75 *per cent*	95,100	4,04,900	5,00,000
	B1	Severe damage - (repair) 25 to 75 *per cent*	95,100	2,04,900	3,00,000
C		Partial damage – 15 to 25 *per cent*	5,200	44,800	50,000

Source: State Government orders.

The State Government has not prescribed any specific mechanism for inspection of damaged houses. As per the prevailing procedure, on reporting an incidence of house damage/collapse, the revenue authorities at the village level inspect the spot and prepare a report assessing the damage by visual means. Subsequently, the Engineer of concerned local body certifies the extent of damage for payment of compensation to the affected family.

In this regard audit observed the following:

- The State Government issued orders/instructions imposing/withdrawing conditions time and again for payment of compensation, which resulted in the district authorities not having a definite set of guidelines and formats for obtaining information and thus, payments were made arbitrarily. (For *e.g.,* order instructing payment of damage compensation based on the percentage of damage and its withdrawal, frequent changes in categorisation of damage, *etc*.);
- The higher compensation announced annually by the State Government based on the severity of the rainfall was limited 'only for a specific period in a year (monsoon)'. The houses damaged due to rainfall/other hazards during the other period/months of the year were not eligible for higher compensation. Random verification of a few individual payment files showed that photographs which

neither had GPS coordinates nor the signs of rain/wetness on the damaged portion/collapsed buildings formed the basis for payment. The records in support of having rained on the date of damage as per the claim, press clippings *etc.*, were also not available. Thus, the possibility of claiming/payment of compensation at a higher rate, even for the houses damaged during the period outside the duration of the calamity, cannot be ruled out.

- It can be seen from **Table 5.4** that 25 *per cent* damage overlapped between two categories – B (B1, B2) and C with significant differences in compensation prescribed. Audit noticed ten instances where damage recorded as 25 *per cent* was paid lower compensation under the 'C category' in certain cases while it was considered as 'B category' in certain other cases and paid higher compensation. This ambiguity allowed Engineers to manipulate (increase/decrease) the percentage of damage initially assessed by the local authorities, to fit the case into a higher or lower category **(Appendix 5.2a)**.

- The absence of definite guidelines on the classification of damage and the huge difference in payment of compensation between categories allowed for arbitrary classification by the authorities. Damages assessed between 70-75 *per cent* (13 instances) were categorised as B1/C while damages of 26-40 *per cent* (29 instances) were categorised as B2/C (**Appendix 5.2b**).

Illustration

In Haveri district, 696 house damages initially categorised as C were subsequently categorised (reportedly on re-verification) as B1/B2 with an increase in financial assistance from ₹50,500 to ₹3.00/5.00 lakh per unit. The district authorities did not explain the reasons for the huge upward variation in assessment of damage from the minor repair level to reconstruction level. In view of the significant difference in the quantum of compensation between the two categories (B1 and B2), audit could not rule out the possibility of fraudulent practices in certifying the extent of damage (**Appendix 5.2c)**.

Audit also noticed that a total of 2,503 houses in eight taluks of Haveri district were identified as damaged under various categories during the year 2020-21 even when the rainfall received was less than normal (the departure from normal rainfall ranged between -13 and +8). A total compensation of ₹64.00 crore[35] *was paid in these cases. Hence, there was no relation between scientific evidence and hazard data.*

- The compensation amount of ₹95,100 prescribed as per SDRF norms for A and B categories was to be paid to the affected persons by the taluk authorities immediately on approval of the case, through bank transfers. However, the additional financing by the State Government was to be obtained through Rajiv Gandhi Rural Housing Corporation Limited[36] (RGRHCL) in four instalments based on the progress of repair/reconstruction. The details of compensation cases sanctioned for A and B categories in the State during the period from 2019-20 to 2022-23 and the status of construction is shown in **Table 5.5**.

[35] Category A - ₹91,00,000; Category B1 - ₹33,50,000; Category B2 - ₹60,13,00,000; Category C - ₹2,62,75,000.

[36] The nodal agency for implementation of rural housing schemes in the State.

Table 5.5 Statement [37] showing the status of construction in respect of compensation cases sanctioned

(number)

Year	Compensation cases sanctioned	Completed houses	Houses in progress	Construction not started
2019-20	43,397	27,691	8,756	6,950
2020-21	8,911	4,876	3,005	1,030
2021-22	27,039	9,819	12,002	5,218
2022-23	31,060	2,804	18,958	9,298
Total	**1,10,407**	**45,190**	**42,721**	**22,496**

Source: Compiled by audit from online data available on RGRHCL portal.

A damaged house for which a compensation of ₹ 95,100 (as per norms) as first instalment was paid was required to commence the reconstruction of house immediately and complete it as early as possible. However, it could be observed from the table above that 22,496 houses for which a total compensation of ₹213.94 crore had been paid, did not commence the construction even after two-three years of damage/payment of compensation. Apparently, these beneficiaries either had alternative dwelling arrangements and were not in need of the additional compensation or the assessments made were not correct.

As a result, ₹213.94 crore[38] paid towards compensation remained unfruitful as the very objective of providing proper accommodation to the affected beneficiaries remained defeated. It could also be seen that in 23,763 cases where compensation was paid prior to 2022-23, construction was at various stages of completion and remained incomplete.

The State Government instructed (October 2022) the DCs of the districts to cancel the compensation sanctioned in respect of houses where construction had not commenced and to issue notices for speedy completion in respect of lingering houses. However, records showed that no action had been taken in this regard by the concerned officers.

- On a house being damaged by flood/rain, it is stipulated that the local revenue authorities were to inspect the spot for assessing the damage and obtain a certificate from the Engineer concerned which was to be approved by the Tahsildar for initial payment and then by the DC for forwarding the case to RGRHCL for further monitoring and payment. RGRHCL was not required to inspect the damaged house or certify the damage but was only to monitor further progress and make payments thereon. However, audit observed discrepancies between categorisation as per taluk authorities and that exhibited in the RGRHCL portal. Cases assessed as category A / B2 were revised to B1 (32 instances) and vice-versa (18 instances) and also A / B1 / B2 was categorised as C (22 instances) (**Appendix 5.2d**). It was not forthcoming as to how RGRHCL authorities revised/modified the category without physical inspection of the house. Inappropriate change of categorisation by RGRHCL, without physically verifying the damaged house, points towards the possibility of depriving the actually damaged house/beneficiary from getting the correct compensation and benefitting an ineligible beneficiary with higher amount of compensation. Matter needs to be investigated.
- One-time financial assistance of ₹50,000 under category C was being paid to the affected families for immediate repair. There was, however, no system in

[37] The figures shown for these cases are year specific and are not progressive.
[38] Construction not started (22,496) * Initial payment (₹95,100) = ₹213.94 crore.

place to check whether the beneficiary had utilised the compensation for carrying out the repairs.

- Once a house was compensated for damage due to a calamity, the State Government should have ensured disaster resilient construction/repair. However, the State Government permitted (2022) to extend house damage compensation though the same house was provided compensation under the "C" category during the previous years. This showed that the State Government was more intent on providing assistance rather than ensuring that the constructions/repairs taken up were disaster resilient.
- The State Government also permitted (2022) damage compensation payments to houses constructed under various government schemes which again indicates that the houses constructed earlier were not disaster-resilient.
- There were 41 instances (**Appendix 5.2e),** where the compensation was paid based only on the assessment done by local authorities and without certification by the Engineer concerned.
- No timelines were prescribed for completion of the construction of houses.

Audit could not ascertain as to how one could assess and decide the extent of physical damage upto a particular percentage just through visual means without any scientific or engineering basis. Audit observed instances of payments though the damage was not clearly visible from the photographs placed on record. Thus, the compensation payments were being made without comprehensive guidelines for damage assessment and proper validation measures and hence, extension of undue benefits cannot be ruled out.

At the instance of audit, the State Government revised (August 2024) the percentage of damage as well as quantum of compensation towards house damages due to rain/flood caused only during the monsoon period[39]. On verification of the revised order, audit observed that the Government had not acted upon other findings in the process of payment of compensation like visual assessment of damage, precautionary measures towards the possibility of claiming/payment of compensation at higher rates, ensuring actual execution of repair work, insisting on disaster resilience to avoid repetition of damage/claims, *etc*.

The Government replied (August 2024) that the compensation towards house damage due to rain has been revised for the year 2024-25. However, no action has been taken by the State Government to investigate omissions pointed out by Audit and to fix responsibility on the erring officials.

5.5.3 Input subsidy for crop loss

The loss of crops had been catastrophic in the State due to various types of hazards, predominantly flood and drought and compensation was paid (including both SDRF and State grants) by the State Government through the *Parihara* portal, as shown in **Table 5.6**.

Table 5.6: Details of crop compensation as per *Parihara* portal

Category	Type of crop	Maximum eligible amount for prescribed two hectares	
		Rainfed	Irrigation
A	Agriculture/horticulture/annual plantation crops	₹27,200	₹50,000
B	Perennial crops	₹56,000	₹56,000
C	Loss of land due to silt	₹24,400	
D	Loss of substantial portion of land	₹75,000	

[39] Off-monsoon period damages to be paid as per SDRF norms.

Audit obtained and analysed the data dump of *Parihara* covering the period 2017-18 to 2022-23. As per the information available on *Parihara* portal, a total of ₹6,752.28 crore had been paid in respect of 5,91,302 number of cases during the period 2018-19 to 2022-23 through *Parihara* portal.

Random verification of the data (through input of data like individual Aadhaar number, year, season, calamity, *etc*.,) showed instances of compensation having been paid in violation of the guidelines (**Appendix 5.3)** and thus, were ineligible as listed below:

i) Farmers were given compensation more than the eligible amount in one season under category A and category B.
ii) Farmers having more than two hectares of land were given compensation under categories C and D.
iii) Farmers receiving compensation under categories of both A/B and D for the same survey numbers and in the same season.

The above instances are only illustrative but not exhaustive. The Government needs to verify and initiate action to ensure payments to only genuine beneficiaries.

5.5.3.1 Irregularities noticed in distribution of crop loss compensation during the year 2019-20

In Haveri district, audit observed that the DC/ADC had booked (February 2020) complaints with the police authorities on the Tahsildars of all the eight taluks under the district alleging fraudulent payments of input subsidy towards loss of crops due to flood during the year 2019-20 and in turn, the police authorities had submitted the first information reports to the concerned jurisdictional magistrate courts.

As per the procedure, the data entry operator at the taluk level was to enter all the details of the beneficiary into the different modules of the portal for submission to the next higher level. In case of any difference in name and aadhaar number of the beneficiary between the e-file submitted by the operator and the RTC[40] data, the Village Accountant concerned should send back the file to the operator for correction and the corrected file was to be approved by the Tahsildar. The consolidated file of all the beneficiaries (in the form of XML file) would be further submitted to DC for approval and payment.

As audit observed that the *Parihara* portal permits an option to the Village Accountant and the Tahsildar to approve the case, even when the details of beneficiaries differ from the RTC records in specific cases like death of the original landholder, sale of land, donated land, *etc*. Exploiting this option, the Village Accountant and the Tahsildars of these taluks had irregularly approved payments towards input subsidy in cases where there were differences in the name of the landholder, survey number belonging to Government land/religious places, *etc*., and made payments to fictitious bank accounts.

However, despite passage of three years after filing of FIRs, no action had been taken by the DC, Haveri to expedite inquiry and take action on the delinquent officials. The DC, Haveri not only did not follow up the case expeditiously but also did not conduct an internal departmental inquiry against the subordinate officials.

The Government replied (August 2024) that the DC, Haveri had been directed to expedite inquiries and take legal action against the erring officials.

[40] Record of Rights, Tenancy and Crop Information.

5.5.4 Omissions in compensation towards water flooding into houses

Habitations/houses constructed in low-lying areas are more prone to inundation during heavy rainfall. Non-enforcement of building bye-law regulations and lack of preparedness results in houses getting flooded during heavy rainfall being a common and regular phenomenon.

As per SDRF norms, houses affected due to water flooding/inundation for more than two days (causing damage to household articles and foodgrains) were to be paid a compensation of ₹10,000 (which included a State additional grant of ₹6,200). The norms did not prescribe any spot verification/inspection by authorities for payment of compensation. An application with a photograph would make a beneficiary eligible for payment. The compensation towards this component was invariably paid in all the test-checked districts. Verification of records showed the following omissions.

- Though water flooding was a regular feature for dwelling units constructed along river/water courses, the State/district authorities did not take action to rehabilitate inhabitants of such houses to safer locations or avoid flooding through structural measures.
- There was no documentary evidence on record in support of the claim that houses were inundated for more than 48 hours which had caused damage to household articles and food grains.
- In certain cases, the photographs showed water stagnation only in the outer premises of the house, without a photograph of water flooding into the house.

The payment of compensation without initiating preventive measures and proper verification facilitated such people to continue residing at places exposed to danger. The compensation payment, therefore, had become a source of regular income for the families living in such houses.

Recommendation 14: The State Government should streamline the procedure for payment of compensation towards damages preventing ineligible payments and fixing accountability on concerned officials for any irregularities.

5.6 Rehabilitation

Rehabilitation and reconstruction are important components of disaster management. In accordance with Section 39(f)(iii) of DM Act, the State Government is responsible for carrying out rehabilitation and reconstruction. Rehabilitation refers to the restoration of basic services and facilities for the functioning of a community or a society affected by a disaster.

Among the test-checked districts, the rehabilitation activities for flood hazard were initiated only in Haveri district. Audit observations noticed thereon are discussed in subsequent paragraphs.

5.6.1 Delay in providing rehabilitation to flood-affected Mustur village

The Mustur village in Ranebennur taluk of Haveri district consists of nearly 350 families and is located on the banks of both Tungabhadra and Kumudavathi rivers and hence was recurrently affected by flood. The then Member of the Legislative Assembly submitted (1992) a proposal to shift the village to a safer location but the same was not done. The distressed village people subsequently represented (July 2014) to the Tahsildar, Ranebennur taluk for shifting the families and providing flood-safe houses.

On verification of records and joint physical inspection (June 2023) of the work site, audit observed that construction of a total of 232 houses was approved by the State Government (May 2016) at a total outlay of ₹17.14 crore. However, only a sum of ₹3.30 crore was released (October 2016) to the contractor (Nirmithi Kendra) through DC, Haveri. Hence, contractor could only ensure partial completion of 116 houses (May 2019) without any basic infrastructure and work remained incomplete since then. However, many families had already occupied the houses though they were not handed over to the department by the agency.

The fact that families occupied the houses that were partially constructed and were without any infrastructure shows the urgent circumstances under which they continued to live earlier. The other families who were either not allotted houses or the construction had not commenced/completed were forced to continue to live in the village with danger of floods.

The fact clearly exhibits incomplete action by the Government/district administration towards providing safer living standards to the flood distressed population even after 30 years of the proposal. Further measures initiated towards achieving envisioned disaster risk reduction, were ineffective.

The Government did not furnish any specific reply to the observation.

5.6.2 Safer residential sites not provided to flood affected families

The villages of Kudala, Allapura, Haravi and Haranagiri in Hanagal taluk of Haveri district were recurrently affected by the flooding of Varada River water. Hence, the Grama Panchayat, Kudala submitted (August 2019) a proposal to the Tahsildar, Hanagal for shifting the affected families to a nearby safer location. The Tahsildar, Hanagal in turn forwarded a proposal (March 2020) to the DC, Haveri for providing residential sites to the affected families of these villages in Maranabeeda village and the DC ordered (September 2020) to reserve the required land for the said purpose.

Audit observed that no action was taken in this regard even as of June 2023. In the meantime, 52 houses in these villages were damaged due to flood/rain and were paid compensation (April 2020) as per SDRF norms. The Additional Deputy Commissioner, Haveri replied (June 2023) that the villages were affected only during 2019-20 and were not affected during subsequent years and thus, there was no proposal for shifting these villages.

Since the proposal was made by the rural population and accepted by the DC on grounds that the villages were being affected by recurrent floods, inaction by the authorities either to provide safer sites or initiate adequate structural measures to avoid flooding is fraught with the risk of exposing the rural population to recurrent danger.

The Government did not furnish any specific reply to the observation.

5.7 Reconstruction of Infrastructure Damaged by Flood Hazard

Reconstruction is the restoration or replacement of severely damaged physical structures, utilities and local infrastructure to its original status. Reconstruction must be fully integrated into ongoing long-term development plans, taking account of future disaster risks. The responsibility of taking up permanent restoration/ reconstruction vests with the respective departments through financing from their regular budgetary grants.

While the nodal department was compiling the data on damages to different types of infrastructure by natural calamities, it was not in possession of the details regarding reconstruction/restoration of damages by the line departments, indicating ineffective monitoring towards providing basic connectivity/services to the affected population.

Though restoration works were taken up and completed, the expenditure incurred for the works was in excess of the SDRF norms in many cases as pointed out in Paragraph 3.1.8. Audit also observed that there were delays in taking up reconstruction/restoration works. Audit conducted a joint physical inspection (October 2022) of three bridges and two roads (State highway) damaged due to flood during the year 2022-23 in Ramanagara district and noticed that the bridges/roads had not been restored and as a result, the public were forced to take alternate longer routes.

Illustrative photographs taken during the JPV of damaged bridges are shown in **Exhibit 5.5** below:

Exhibit 5.5: Photographs showing the damaged major bridges

Source: Photographs taken during the JPV.

Scrutiny of the proposals showed that the individual restoration works were estimated to cost between ₹5 lakh and ₹15 crore. With respect to the above two bridge works (Harisandra and Manchenabele), DPRs were under preparation and the restoration works were in progress for one bridge (Suggenahalli).

Chapter - VI
Landslides

CHAPTER VI

Landslides

The State had been experiencing a spurt in incidences of landslides since 2016, particularly in the Western Ghats. This could be traced to factors such as population growth, unchecked infrastructure development, changes in land cover and land use besides extreme rainfall induced by climate change.

Audit identified issues such as insufficient preparedness and commitment to landslide mitigation. The State Government delayed publishing the State Action Plan for Landslide Management until 2022. Discrepancies in hazard zonation maps, the absence of a landslide inventory, and non-deployment of necessary monitoring equipment highlighted a critical need for effective interventions, particularly in Kodagu district.

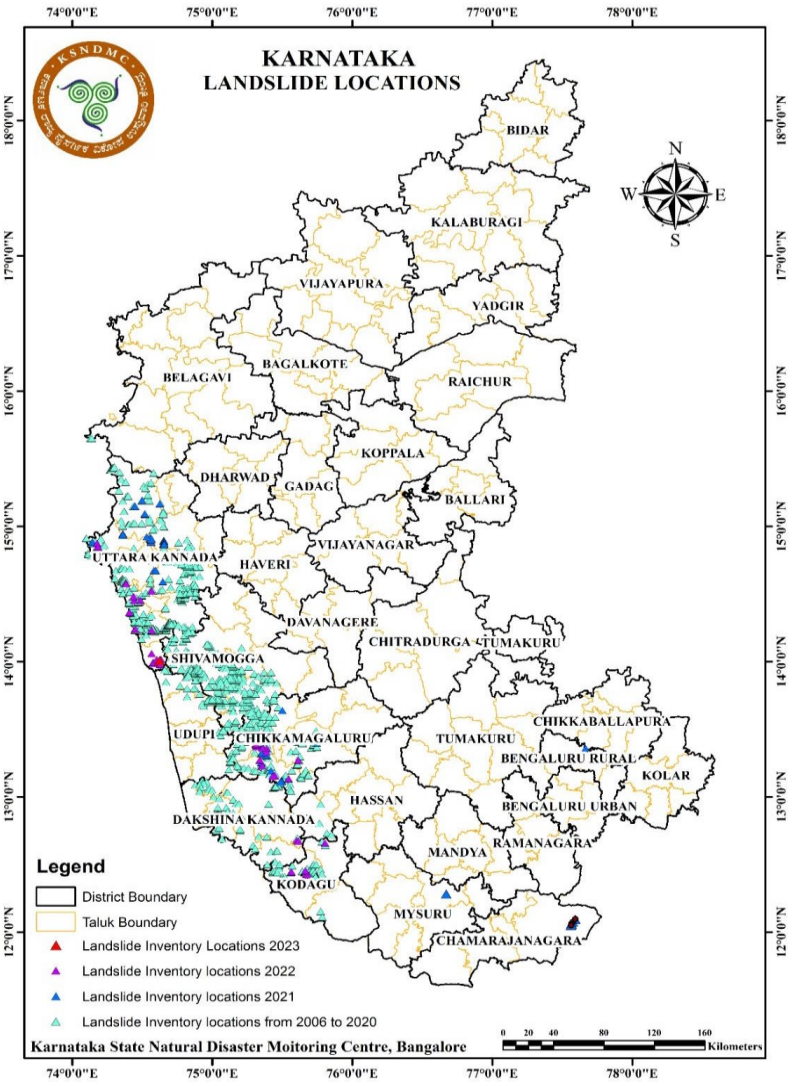
A separate case study on the Kodagu landslide events revealed a lack of guidelines or regulations for land use and cover to mitigate the hazard. Systemic lapses in government monitoring were evident in incidents like the collapsed retaining wall at the Deputy Commissioner's office in Madikeri. Unauthorized constructions were regularized, and agricultural land continued to be converted for commercial uses, highlighting inadequacies in disaster-resilient infrastructure planning and execution.

Landslide hazards rank high among hydrogeological hazards because they pose a threat to life and livelihood ranging from disruptions of normal activities to widespread loss of life, and property, and destruction in large parts of mountainous regions. The primary causes of landslides are forces due to geology, weathering, water content, vegetation, slope angles, human activities, *etc*.

6.1 Karnataka State Landslide Hazard Profile

In the State, landslides affect at least 15 *per cent* of the total land area of Karnataka, mostly falling in the Western Ghat region which includes 29 taluks of seven districts *viz.,* Uttara Kannada, Shivamogga, Chikkamagaluru, Udupi, Dakshina Kannada, Kodagu and Hassan districts. Landslide vulnerability map of Karnataka, as mapped by KSNDMC is shown in **Chart 6.1.**

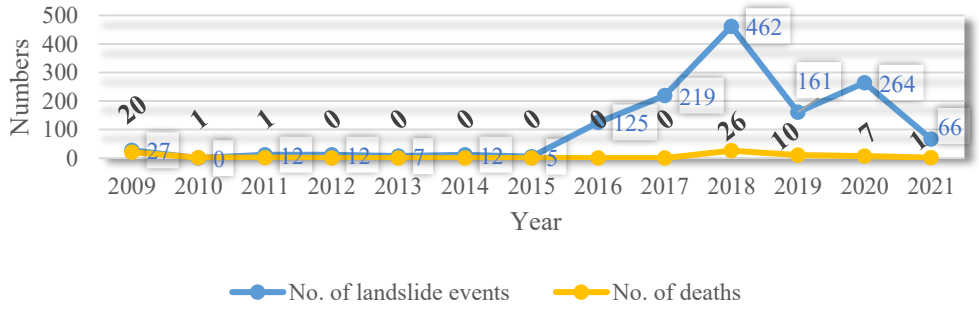
Chart 6.1: Landslide vulnerability map of Karnataka



Source: KSNDMC.

The landslides in the State had caused widespread damage and many casualties, together with significant economic losses and social disruption. The number of landslides and consequent human causalities recorded between the years 2009 and 2021 is shown in **Chart 6.2**.

Chart 6.2: Number of landslides and deaths in the State



Source: Karnataka State Action Plan: Management of Landslides-2022.

It can be seen that the landslide events have increased significantly since 2016. This can be attributed to the growth of population and consequent infrastructure development in violation of the zonal regulations together with the extreme rainfall events triggered due to climate change (as per GSI report). Deforestation is also a contributing factor to landslide. Among the test-checked districts, Dakshina Kannada and Kodagu were the most vulnerable and had been severely affected by landslides since the year 2018.

Illustrative photographs showing the intensity of destruction caused by landslides in various parts of the State are depicted in **Exhibit 6.1**.

Exhibit 6.1: Media reports showing the intensity of landslide destruction

Source: Media reports.

6.2 Landslide Impacts

Landslide hazards have both short-term and long-term impacts on society and the environment. The short-term impact accounts for the loss of life and property at the site and the long-term impact includes changes in the landscape that can be permanent, including the loss of cultivable land and the environmental impact in terms of erosion and soil loss, population shift and relocation of population and establishments. Like in any other disaster, the most affected by the landslides are the socio-economically weaker sections of the society who inhabit vulnerable areas.

Neither the data on expenditure incurred by the Government towards management of landslip hazards over the years nor the details of environmental damage and socio-economic impact thereon, on the farming community in particular, were available with the Government.

6.3 Preparedness towards Landslides

6.3.1 Landslide management framework

Landslides can be predicted, and the vulnerability to landslides, as well as the areas within landslide zones, can be clearly mapped out by land modelling utilizing remote sensing and Geographical Information System (GIS) technology. This information was deemed crucial for the provision of early warnings, the execution of evacuation exercises, and general preparedness. Thus, there was a need for a comprehensive Landslide Risk Management Strategy (LRMS) addressing all components of landslide disaster risk reduction and management, such as hazard mapping, regulations and policies, stabilization and mitigation of landslides, early warning systems, awareness programmes, capacity building, and training, among others.

Although the National Disaster Management Guidelines on the Management of Landslides and Snow Avalanches was formulated in 2009 and the specific National LRMS was introduced by NDMA in September 2019, the State published the Karnataka State Action Plan: Management of Landslides only in 2022.

The Government replied (August 2024) that the 'Karnataka State Action Plan: Management of Landslides' addressed all the components of landslides and action was being taken for monitoring rainfall in moderate to high-risk areas through rain gauge network of KSNDMC.

Reply is not convincing as significant gaps remain in its implementation. The State's response primarily focussed on rainfall monitoring without addressing broader preventive measures and community preparedness outlined in the plan. Further, the devices for monitoring rainfall as indicated in the previous chapters are largely non-functional.

6.3.2 Inappropriate landslide hazard zonation maps

The strategic document of NDMA recommended the preparation of Landslide Hazard Zonation maps at both macroscale and mesoscales (1:50000/25000 and 1:10000, respectively) employing advanced state-of-the-art tools such as Unmanned Aerial Vehicles (UAVs), Terrestrial Laser Scanners, and very high-resolution Earth Observation (EO) data.

As per the State Action Plan: Management of Landslides-2022, the State prepared the district-wise susceptibility maps, which are shown in **Appendix 6.1.** Audit observed that the test-checked districts of Dakshina Kannada and Kodagu possessed the zonation maps, which were prepared to adopt a scale of 1:325000 as against the envisaged scale of 1:10000. However, the period during which these maps were prepared was not on record and thus, audit could not ensure whether these maps were prepared by the district administration as a tool for preventive action against the landslides.

The Government replied (August 2024) that action would be taken to prepare the maps on a prescribed scale in consultation with GSI and other related departments/agencies.

6.3.3 Absence of landslide inventory

The preparatory measure for initiating preventive actions was to identify, map and list the landslides/landslips over a time series. The landslide inventories contain

basic information about landslides such as location, classification, morphology, volume, run-out distance, activity, and date of occurrence *etc*. Though the State had identified (2022) broad zones/locations and road sections vulnerable to landslides, the district authorities of the test-checked districts were not in possession of landslide inventory.

The absence of a defined framework and landslide inventory coupled with mapping with lesser resolution led to inadequate preparedness, and risk assessment ultimately exposing the vulnerable communities and infrastructure to danger.

The Government replied (August 2024) that the district authorities and KSNDMC would be instructed to compile data on landslide incidences as well as to prepare a detailed inventory to enable planning preparedness and mitigation measures. Further, though Government claimed to have possessed inventory of 1495 landslides in the State, the same was not furnished to audit.

6.3.4 Monitoring/Forecast Mechanism

Monitoring is an important component of landslide investigation/studies that includes the measurement and analysis of landslide dynamics as well as changes in the factors that cause landslides. Monitoring of landslides can be both surface and subsurface. The Government itself had accepted in the State Action Plan that landslide monitoring is generally not practised.

6.3.4.1 Failure to deploy scientific equipment

The primary geo-physical causes for any landslip are the formation of linear/vertical cracks or piping cavities, as shown in **Exhibit 6.2**, which may be natural or have occurred due to man-made activities.

Exhibit 6.2: Formation of linear/vertical cracks

Source: Photographs furnished by KSNDMC.

These fractures/cracks in the earth could be studied, analysed, and monitored by installing technologically available instruments like a Crack meter/Joint meter where the cracks are visually apparent, and Inclinometer/Piezometer/Tilt meter/ Borehole extensometer, *etc.*, where the subsurface deformation and depth of sliding is not apparent from surface measurements and visual observations.

Audit observed that the State Government/SDMA or the DDMAs did not initiate necessary action to adopt available technology and to install the forecast mechanism equipment in any of the hazard-vulnerable points/locations. Hence, there was no established procedure for forecasting this disaster in the State.

6.3.4.2 Early warning systems

Dissemination and communication mechanisms, as far as early warning systems are concerned, must be operational, robust, and available around the clock. These should be designed to meet the needs of a wide range of different threats and different user communities. The landslide risk management strategy also recommended Landslide Monitoring and Early Warning Systems[41], Stabilization and Mitigation of Landslides, and the creation of a Special Purpose Vehicle (SPV) for landslide management, capacity building, and awareness programs.

Audit observed that the State Government had not acted upon these recommendations. Thus, in the absence of advanced technological equipment and early warning systems, the Government/district authorities could not disseminate any alerts which exposed the local community to landslip hazards without a forecast mechanism.

The State Government stated (August 2024) that the GSI had pioneered early warning system for landslides in July 2024, which will be rolled over across the country in the next three months. Evidently, the early warning mechanism against landslides hazard was absent in the State. It is further stated that the KSNDMC had entered into a Memorandum of Understanding (MoU) with Geological Survey of India, Kolkata towards the development of an experimental rainfall threshold-based regional landslide forecasting system for Karnataka and soon after the project approval, actions will be taken to deploy scientific instruments. However, audit observed that although the MoU was entered into in March 2023, KSNDMC was not in possession of details of progress in this regard.

6.4 Mitigation Measures

Landslide hazard management involves measures taken to avoid or mitigate the risk posed by landslide hazards.

6.4.1 Absence of determined commitment towards risk reduction

Numerous studies, including those by the Geological Survey of India (GSI), have linked recurring and widespread landslides in Kodagu district since 2005 to various factors. These factors include transverse surface cracks resulting from increased pore water pressure due to heavy rainwater infiltration, slope cutting for road construction, anthropogenic factors intensified by heavy rainfall, unregulated habitation expansion disrupting the natural equilibrium, land modifications for agriculture and road development, extensive slope cutting along roads, structural modifications increasing susceptibility, destabilization due to slope toe removal, inadequate drainage leading to water seepage into joints and fractures, and poorly designed houses without basements.

Recommendations arising from these studies propose measures based on the specific causes of landslides. These measures include establishing proper drainage systems to manage slope water, constructing retaining walls, implementing inclined piles at slope toes, using stone pitching and gabions, employing biotechnical slope protection, and geometrically modifying slopes through grading and benching. Additional recommendations include planting stabilizing grass like

[41] Such as Rainfall Threshold-based Landslide Early Warning System, Ground Instrument-based Landslide Early Warning System, Seismicity-induced Landslide Early Warning System, *etc.*

vetiver, removing loose boulders, exercising caution in construction activities within high and moderate susceptibility zones, and conducting detailed site-specific studies before civil construction projects.

However, the State Government had not taken proactive steps to address the findings and recommendations from these studies. The DCs of Dakshina Kannada and Kodagu districts which were affected by the recurrent landslides replied that either structural or non-structural measures were not taken prior to devastation and action had been initiated in this regard only after 2018-19.

6.4.2 Laxity in implementation

Furthermore, a study report titled "Landslides in Coorg District of Karnataka State," published in the International Journal of Innovative Research in Science, Engineering, and Technology (Vol. 5, Issue 6, June 2016), emphasized the role of land use and human activities, specifically slope excavation being the contributory factor for landslides besides climatic conditions. Nevertheless, the State Government and the State Disaster Management Authority (SDMA) did not impose restrictions on infrastructure, human, or commercial activities that contributed to the destruction of natural geographical conditions, thereby neglecting preventive measures. Additionally, no efforts were made to conduct risk analysis and assessment.

The GSI in its reports on Kodagu landslides recommended to avoid vertical cut slopes as it unstabilises the slope and insert horizontal perforated pipes into the slopes which will act as weep-holes in the vertical slopes. Audit team conducted (June-July 2023) joint physical verification of selected reachable locations and stretches of roads affected by landslides under Kodagu and Dakshina Kannada districts and observed the following:

- The works executed towards repairs and restoration of roads were inappropriate as the authorities were still resorting to steep vertical cut formation along the roads, exposing the road and the terrain for possible landslips (**Exhibit 6.3(a)**).
- Retention walls constructed to arrest further landslips were without weep hole facility and hence, were fraught with the risk of washing off the structure due to infiltration during excessive rainfall incidents (**Exhibit 6.3(b)**).

Exhibit 6.3(a) **Exhibit 6.3(b)**

Source: Joint Physical Verification.

- Stabilization works were not taken up in landslide locations despite the visual appearance of huge natural drainage cavity (**Exhibit 6.4**).

Exhibit 6.4: Landslide location with natural drainage cavity

Monnangeri II

Monnangeri II

Source: Joint Physical Verification.

- Proper drainage facilities were not provided to either new or restored road works.
- Action was not taken by the State/District authorities to install early warning equipment.
- State/district administration had neither restricted land conversions nor construction of houses unscientifically and without approval. Instead, compensation at higher rates was paid in case of damage to such houses due to landslips.

The State Government stated (August 2024) that action had already been initiated to implement the recommendations of the study teams and that district administrations vulnerable to hazards had submitted various proposals for the management of landslides. However, neither the details of the action initiated to implement the recommendations nor the proposals submitted by the districts were furnished to audit. Timelines to implement the proposals are also needed to be factored to counter the increasing incidence of landslides.

6.5 Landslides in Kodagu – A Case Study

Kodagu witnessed major flood-cum-landslide events during the year 2018-19 which was very devastating as nearly as 20 lives were lost and many properties were damaged. After the devastation, the State Government/district administration requested the Geological Survey of India (GSI) to conduct a post-disaster investigation of landslides that occurred in Kodagu district. The GSI submitted its detailed investigation report in October 2019.

The major causal factors for slope failures reported by GSI (which studied around 105 landslides and subsidence) included geological lineaments, lithological factors, modification of the natural slopes, high angle (vertical or near vertical) slope cut for road construction, rapid modification for construction of infrastructure like houses, hotels, homestays, *etc.*, large scale slope modification for plantations (especially coffee), blockage of natural drainages, creation of water tanks, ponds throughout plantation estates modifying the actual slope, *etc*.

The report also highlighted the absence of guidelines or land use/land cover regulations to monitor land use pattern and recommended a wide range of measures for arresting/mitigating the landslide hazard. However, the State/district administration did not comprehensively act on the recommendations (March 2024) and could not mitigate landslide hazard.

Consequently, the State Government appointed (April 2020) a High-Power Committee headed by the Chairman, Karnataka Biodiversity Board, Bengaluru to study landslides in Karnataka. The committee submitted its report in March 2021. The High-Power Committee also attributed the severe landslides in the districts under western ghats to slope modification by human interference, drastic change in land use/land cover, manmade loss of vegetation, natural drainage blockage, forest land conversion, *etc*. The Committee, *inter alia,* recommended streamlining and strengthening ground-level institutional framework, possessing geo-referenced landslide inventory and landslide susceptibility maps, landslide risk analysis and management plan, developing a Comprehensive Landslide Prevention and Mitigation Plan (CLPMP), framing a well-defined land use policy, prevention of illegal roadside and forest encroachment for commercial activities, *etc*.

Further, KSNDMC in consultation with the experts from Amrita Vishwa Vidyapeetham, Kerala, jointly investigated[42] (May-June 2022) the landslides and recommended measures to monitor and mitigate the landslide and related multi-hazard disasters. The study team, after detailed field verification, noted heavy rainfall in a short span of time, presence of tectonic lineaments, construction of houses and disturbance to the natural course of ephemeral drainages, changes in hill-slope agriculture patterns (such as coffee and rubber plantations), inappropriate ways of interfering with hill-slope formations *etc*.

Despite these remedial reports, the Government/district administration did not initiate adequate measures towards mitigating hazards of landslides as discussed in successive paragraphs.

6.5.1 District Land conversions - Disaster Risk Evaluation and Land management

In the aftermath of the devastating landslides and based on the inputs of GSI, the Government imposed (November 2018) ban on land conversion from agricultural to non-agricultural purposes in Kodagu district. However, the State Government modified (May 2019) the order lifting the ban on land conversions and allowed conversions for residential purposes up to an extent of 15 to 20 cents. As per this order, the following conditions were to be followed during land conversions for the proposed place which is:

- other than non-stable area/zones notified by GSI;
- located more than 10 meters from the river channels;
- avoiding steep slopes and valleys;
- at a place far from 2018 monsoon landslide-hit areas.

The State Government further modified (June 2020) the order and allowed land conversions for all including commercial purposes. A technical committee including a GSI scientist (later replaced by Scientists of Department of Mines and Geology, Madikeri) was empanelled for scrutiny and the same conditions stipulated in May 2019 were reiterated.

The status of land conversions during the years 2018-19 to 2022-23 in Kodagu district is shown in **Table 6.1**.

[42] Multi-disciplinary Landslide Post-Disaster Assessment and Action Plan for Kodagu District.

Table 6.1: Status of land conversions during the years 2018-19 to 2022-23

Year	Applications received	Conversions approved	Rejected	Percentage of approval
2019	1,247	541	706	43
2020	1,365	935	430	68
2021	1,223	903	320	74
2022	2,717	1,914	803	70
2023 (up to June)	463	315	148	68

Source: Information furnished by DC, Kodagu.

The data presented in the table clearly indicates an upward trend in the number of conversions and approval of applications each year.

Audit extracted the details of 207 conversion cases[43] from the '*Bhoomi'* database to check whether the areas proposed for conversion were forming part of the vulnerable zones. Audit observed that the survey number-wise landslide risk information in the district was absent. In the absence of critical granular level information, particularly relating to disaster-prone villages identified by GSI, audit could not ascertain whether the lands sought for conversion were in the landslide-prone zone or not.

The Department of Mines and Geology, which was technically responsible for site-specific investigations for land conversions had its own challenges. It lacked the necessary instruments, laboratory facilities, and experts to conduct geotechnical studies. The non-availability of technical data such as slope maps, landslide susceptibility maps, soil type maps, digitized toposheets and software hampered its effective functioning. Moreover, the geologists were to conduct site inspections and prepare the technical report as per the 18-point check list devised by GSI.

Audit reviewed the geologist reports for 20 out of 207 cases selected at random and noticed that the opinion/input provided against crucial parameters was either general or not site-specific. The Department of Mines and Geology stated (September 2023) that it had only two geologists and one vehicle to cover all the five taluks of the district in addition to their regular duties and the number of land conversion applications being received is increasing at a higher pace. It further stated that the department was not trained on the aspects of landslide study, terrain evaluation with respect to urbanisation and recommendation for land conversion from agriculture to non-agricultural activities. Further in the absence of the required maps, it could not ascertain the exact vulnerability of the area which applied for conversion and hence, the report was prepared based only on superficial observations. Thus, the geologists were unable to prepare the technical report for controlling unscientific constructions and ensuring proper land use management to mitigate future disasters.

The report, however, contained the details of past landslide history, the elements at risk and the final remarks which provided an insight for the Committee to decide the suitability of the proposed land for conversion. A few examples from the 18-point checklist (which are only illustrative and not comprehensive) are given in **Table 6.2** :

[43] Extent of land converted in excess of one acre was selected.

Table 6.2: Illustrative details of past landslide history in Kodagu district

Details of land converted	Parameter for evaluation as recommended by GSI	Remarks of the geologist
Sy no. 216/20 – Katageri village, Sampaje hobli, Madikeri taluk - 1 acre for commercial purpose	Element at Risk	Houses are present in both upslope and downslope area
	Excavation	Required as per construction plan
	Old landslide history	There was history of landslide occurrences within an area of 198 meters
	Final remarks	40 degrees slope towards west direction. In the case of multi-storeyed buildings, it is suggested to conduct geotechnical studies to mitigate structural failures. A layout plan of the applied area is to be obtained by the applicant and the same is to be approved by the concerned authority adhering to standard building guidelines. Since a major part of the area lies in hilly terrain, the selection of sites and development of buildings in hilly areas may be done as per the Indian Standard Guidelines IS 14243 (Part-2):1995.
Sy No.393/1- Kedemalluru village, Virajpet taluk – 6.06 acre for commercial	Element at Risk	No major structure is found in upslope or down slope area
	Excavation	Excavation is required as per the construction plan
	Old landslide history	There was a massive landslide in Thora village in August 2019 which is at a distance of 2.9 kms from the proposed place of conversion.
	Final remarks	The area is a sloppy terrain with 20-to-25-degree angle towards west direction. Suitable precautionary measures should be taken during construction without much land deformation.
Sy No. 115/19 Katageri village, Sampaje hobli, Madikeri taluk – 8 acre - Commercial	Element at Risk	No major infrastructure is present in upslope and downslope area.
	Excavation	Required as per the construction plan
	Old landslide history	There was a landslide at Talathmane which is 1.6 kms from the proposed conversion land
	Final remarks	Since a major part of the applied area lies in a hilly terrain, selection of site and development of buildings in hilly areas may be done as per the Indian Standard Guidelines.
Sy No. 2/11 – 1 acre and 2/12- 1 acre. Bettageri village, Ammathi hobli, Virajpet taluk – 2 acres for commercial purpose	Element at Risk	Buildings are present at downslope side
	Excavation	Required as per construction plan
	Final remarks	The area in the west direction is at a slope of 40 to 45 degrees. Since the applied area lies in a hilly terrain, selection of site and development of buildings in hilly areas may be done as per the Indian Standard Guidelines

In all the above cases, the committee responsible for assessing and approving the land conversions accorded approval for conversion of lands from agricultural to non-agricultural, mainly for commercial purposes, overlooking the report of the geologist. Other than the geologist, the role of the other members of the technical committee was only to verify the completeness of documentation to issue NOCs.

Audit also noticed that the Tahsildars/Village accountants/Revenue Inspectors were certifying that the four conditions stipulated in the orders of May 2019 and June 2020 were complied with, though the first condition of ascertaining the stability of the area was not within the purview of their competency as it was a technical parameter.

On the other hand, the role of the town planning department in the technical committee was not established in the examined land conversion files. There was a shortage of technical personnel in the town planning department and city municipal council, both of which were connected to post-land conversion activities. There were only two members present out of the 10 sanctioned posts in each of the institutions.

Furthermore, the procedure for geotechnical and structural evaluation of buildings as per Indian Standard Guidelines, was not clearly defined. Specific guidelines and bylaws related to safety in building construction were found to be absent, particularly after the 2018 landslides.

During review of the 20 test-checked files, audit observed two instances wherein the land that already had structures built on it was submitted for conversion from agriculture to non-agriculture purposes. The Committee approved the conversions in both cases after levying penalty.

It is, therefore, apparent from the above observations that structures were being constructed unauthorisedly without being monitored by the respective authorities, which could disturb the stability of the slopes leading to landslips. Thus, the conversions in the district were approved disregarding the primary purpose of protecting the district from future disasters. Blatant disregard of guidelines while approving conversion of land use is an invitation for further disasters and landslides. The State Government needs to focus on such conversions and reverse such incorrect conversions.

The State Government stated (August 2024) that departments concerned have been asked to regulate construction in the landslide prone area as per the existing rules, regulations and laws. The reply highlights the lack of coordination among the departments in mitigating landslide hazards.

6.5.2 Proposed corrective measures not taken up in landslide affected Bhagamandala

Talakaveri or Talacauvery is the source of the river Kaveri located on Brahmagiri hills near Bhagamandala in Kodagu district. In August 2020, there was a massive landslide along the approach road to Talacauvery temple involving both human and property loss in this hazardous event. Even before this dreaded calamity, the GSI had conducted studies in the year 2019 and indicated the causative factors of a possible landslide in future. One of the stated factors was *"the presence of forest trenches on upslope, parallel to ground crack, facilitate water logging and subsurface infiltration during monsoon season. The ground cracks and contour trenches observed on the slope acted as pathway for water infiltration resulting in increased hydrostatic pressure and reduced shear strength. Brahmagiri hills, as observed, are dissected with road cuts, forest trenches and settlements making the slopes vulnerable".*

Based on these observations, GSI recommended to take up following precautions to avoid any further eventualities in future.

i) Appropriately designed retaining structures of suitable height with firm foundations are to be erected from road level for checking slope failures.

ii) There should be a proper and adequate drainage system.

iii) Any trenches or cracks, if present on the slope should be monitored and filled up with impervious material and planting of deep-rooted plants or vetiver grass.

The GSI also opined that Brahmagiri Hills is a potential risk zone due to intense human activities. Since this area witnessed multiple reactivations of slides from past years, it was not advisable to rehabilitate this landslide-affected zone till the slope is stabilized to the best possible extent.

However, neither State Government nor district administration issued any circular/ instructions stipulating these recommendations of GSI for strict compliance by concerned departments for averting landslides. Further, the DC, Kodagu had convened (28 December 2020) a meeting to review the precautionary measures to be taken as recommended by GSI. The Assistant Conservator of Forest who was present in the meeting stated that a high-level committee of Forest department had inspected the landslide and provided its recommendations. The DC then addressed (29 December 2020) letters to the Principal Secretary, Forest, Ecology and Environment Department and Principal Chief Conservator of Forest, Bengaluru stating that there was the presence of forest trenches up to a depth of 3 km in the areas where the landslide occurred during February 2020 and requested to take up the precautionary activities as suggested by GSI.

The DC also instructed the Public Works department to prepare an action plan to take up the works such as construction of retaining walls, proper drainages and culverts in the landslide affected areas and directed that the works be completed before the onset of next monsoon i.e., by May/June 2021.

However, the details of works/precautionary activities taken up, if any, by the PWD or Forest Department on the instructions of DC were not forthcoming from records indicating lack of monitoring by the district administration to arrest further degradation of vulnerable locations.

The Government replied (August 2024) that the details would be furnished after seeking a report from DC, Kodagu. It may be noted that the draft report was submitted to the Government during November 2023 and the department had not yet sought the report/replies from the concerned authorities even as of August 2024. The reply evidences inaction by the nodal department towards mitigating the hazards of disasters and landslides, in particular.

Recommendation 15: The State Government should put in place a proper institutional framework integrating geo-referenced landslide inventory-cum-susceptibility maps, regulate landslide risk areas and develop a Comprehensive Landslide Prevention and Mitigation Plan to avoid geological disaster. The Government should also ensure thorough site assessments of land conversions and enforce zoning regulations.

6.5.3 Improper design resulted in failure of the retaining wall to the Deputy Commissioner office building complex

The Kodagu District Administrative Office complex at Madikeri houses the Office of the Deputy Commissioner and District Magistrate (DC), Kodagu and 19 other district level departments. The office complex was constructed by Karnataka

Housing Board during 2013-14 on a hillock which is a landslide-vulnerable zone (**Exhibit 6.5**). The threat perception to the building complex was high as a couple of landslides occurred on the Madikeri-Mangaluru Road adjacent to the building.

Exhibit 6.5: DC office complex situated on a hillock

Source: Media report

As a precautionary measure against probable landslips and consequent damage to the office building, the DC submitted (October 2016) a proposal to the State Government for construction of Terra Link and Reinforced Earth (RE) Retention Wall (for a length 140 mts and a height of 15 mts) and an approach road at a cost of ₹5.00 crore[44]. Audit observed that there was an inordinate delay in obtaining the approval of the Technical Advisory and Estimate Scrutiny Committee by the Public Works, Ports and Inland Division (PWPID) and the district administration and the State Government accorded administrative approval to the work during October 2018. However, funds for the work were not released.

Due to the efflux of time, the Executive Engineer, PWPID, Madikeri submitted (26 December 2018) a revised cost estimate of ₹7.00 crore for the work. The DC forwarded (January 2019) the revised estimate to the Government for approval and release of funds. The Government approved it in May 2019 and the work was put to tender (December 2019).

In the meantime, as no protection work had taken place more than three years after submitting the proposal, the land mass on the slope side of the building collapsed in August 2020 and the slid hillock portion was covered with plastic sheets to avoid further mud slide on to the adjacent highway.

Subsequently, the work was awarded (November 2020) to a contractor[45] for ₹7.58 crore (including GST) with a stipulation to complete the work within 11 months. Though the site was handed over to the contractor during December 2020, the designs for the construction of the wall and road were made available only during March 2021. However, the work was stopped (July 2021) for about five months due to heavy rain.

Verification of records showed that, while the work was resumed and fixing of the concrete panels of the RE wall was completed to a height of 14 meters, a few of the concrete panels of the wall got dislocated (first week of July 2022) and bulged

[44] Estimate prepared by Executive Engineer, PWPID based on the 2015-16 SR of Mangaluru circle.
[45] Sri UV Ramanjaneyulu of Sri Ayyappa Constructions, Hyderabad.

out posing danger of complete collapse of the wall and the hillock. The Superintending Engineer, Hassan Circle and the Chief Engineer, C and B (South), Bengaluru who inspected (07 and 08 July 2022) the work site attributed dislocation of the panels of RE wall to absence of a proper drainage facility alongside the worksite and consequent percolation of water/rainwater through the embankment abutting the RE wall (without any provision to drain out) hence they instructed covering the embankment with plastic sheets. The deformation of the wall panels increased day by day and was thus, supported with metallic structural measures and sandbags, as suggested by the engineers and experts.

To rectify the dislocation, all the concrete panels of the wall had been dismantled (December 2022) along with the embankment. Experts from IISc who inspected the worksite during May 2023 suggested a revised drawing and design for the work and the same was approved.

The work on which a total expenditure of ₹6.25 crore had been incurred and was scheduled for completion by November 2021, still remained incomplete even as of August 2023. Audit conducted a joint physical verification (August 2023) of the worksite and noticed that there was no progress in work since July 2022 and the entire work portion was covered with plastic covers to avoid further seepage due to monsoon rains (**Exhibit 6.6**).

Exhibit 6.6: Retention wall location covered with plastic sheets

Source: Photographs taken during JPV.

Thus, the office complex as well as the lives of the employees working therein were threatened due to the improper decision for construction of the District Administrative Office complex on a landslide vulnerable location without proper protection. The problem was exacerbated by the construction of a retention wall without drainage facility.

The above illustration also points to the negligent approach of the administration towards creation of a disaster resilience environment. The construction of a vital public office building on a sloppy hillock without adequate protection continuously exposes the life of government employees including the Chairperson of the DDMA (the DC) to the threat of landslides. The work which needed to be prioritised still languishes.

The State Government stated (August 2024) that reply would be submitted after getting a detailed report from DC, Kodagu.

Recommendation 16: The State Government should prepare a comprehensive landslide risk management strategy with zonal mapping and ensure landslide resilience in constructions through effective structural measures.

6.6 Relief and Rehabilitation/Reconstruction

As in other disasters, the State Government/district administrations paid relief compensation to the landslide affected population on the norms prescribed by the SDRF/NDRF along with additional assistance from the State Government. However, the details of expenditure towards compensation for landslides paid during the audit period were not forthcoming from records of the test-checked districts.

On an analysis of the data available on '*Parihara'* portal meant for payment of compensation for loss of crops, audit observed that a total sum of ₹6.23 crore had been paid towards crop loss due to landslides during the period from 2018-19 to 2021-22.

6.6.1 Construction and allotment of rehabilitation houses

Of the test-checked districts, the Kodagu district administration had initiated rehabilitation measures through construction of houses[46] (at different identified locations) for distribution to affected families who lost their houses in the devastative landslides during the years 2018-19 and 2019-20 as well as to those whose houses were in vulnerable locations.

A total of 730 beneficiaries were identified for allotment of houses under rehabilitation programme. The details of estimated outlay, agreement with entrusted agencies, agreed cost, expenditure incurred on construction, handing over of completed houses, *etc.*, were not made available to audit. Hence, audit could not ascertain the total expenditure incurred towards construction of rehabilitation houses in the district.

As per the available records, 666 houses were reportedly allotted to beneficiaries. The audit team conducted (20 June 2023) a joint physical inspection of houses constructed at Galibeedu and Jamburu locations along with the officials of district administration and illustrative photographs of the houses are shown in **Exhibit 6.7**.

Exhibit 6.7: Houses constructed at Galibeedu and Jamburu locations

Source: Photographs taken during joint physical inspection.

However, many houses in Galibeedu seemed unoccupied by the beneficiaries primarily due to insufficient transportation options and connectivity challenges.

[46] Funded by Government and Infosys foundation.

The Government did not offer any comments on the audit observation (August 2024).

6.6.2 Damaged houses/sites not taken over by district authorities

On allotment of a house to a beneficiary as part of rehabilitation, it was required for the district administration to immediately take over the possession/title of the damaged property, to desist the family of the beneficiary from further continuing in the same location and meet with any disaster later. Though the district/taluk administration had allotted new houses to the identified beneficiaries, it did not initiate any action to take possession of the properties in lieu of which the rehabilitated houses were allotted. This resulted in the beneficiary's holding possession of both the newly constructed house as well as the damaged house.

Audit conducted (September 2023) a joint physical examination of the damaged houses in Indiranagar and Chamundeswari nagar of Kodagu district where many houses were destroyed by landslides during 2018. The team noticed and interacted with three of the beneficiaries who continued to reside in the damaged houses endangering their lives even though they were allotted rehabilitated houses (H.nos. 10, 67 and 73) in Galibeedu.

Evidently, the district administration did not ensure that families shifted to the newly allotted houses from the distressed premises to avoid further loss of infrastructure and human lives due to any untoward happening. Further, the correspondence (February 2023) on record showed that the district administration had received complaints on illegal occupation of houses due to beneficiaries leasing/letting out the allotted new houses.

The Government did not offer any comments on the audit observation (August 2024).

6.6.3 Providing financial assistance without ensuring landslide resilient construction of houses

As a relief measure to the families of houses damaged due to landslides or the houses which were dangerously vulnerable to landslips, the State Government provided financial assistance of ₹9.85 lakh per house for reconstruction either in the same location or a different site belonging to the affected family.

Audit observed that 83 families in Kodagu had availed the benefit, of which 73 families had opted to construct the house on their original sites. Since the original sites were vulnerable to landslide disaster, the constructions taken up were to be landslide resilient. However, the district administration had neither insisted upon nor provided appropriate technical specifications for construction and thus, did not ensure that the houses constructed were landslide resilient and safe from further disasters.

The Government did not offer any comments on the audit observation (August 2024).

Chapter - VII
Other disasters affecting the State

CHAPTER VII

Other disasters affecting the State

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

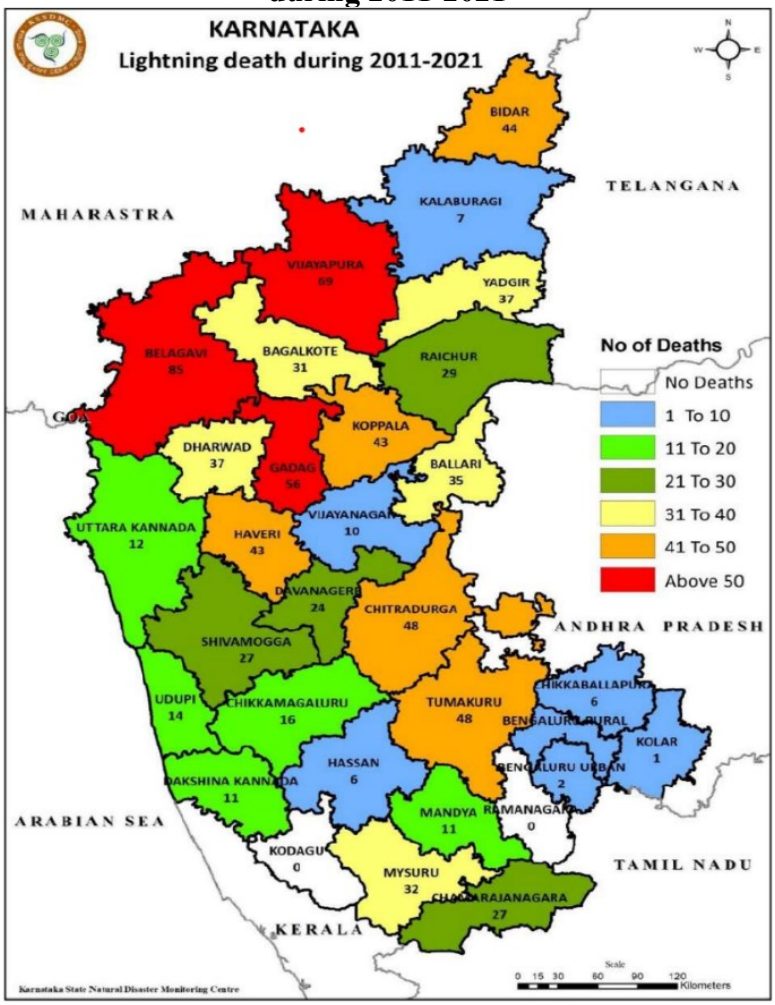
Lightning is a sudden electrostatic discharge that occurs during a Thunderstorm. This discharge occurs between electrically charged regions of a cloud called intra-cloud lightning, between Cloud to Cloud or between a cloud and the ground.

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

Appendices

Appendix 2.1
(Reference: Paragraph-2.1.4.2, Page No. 14)
Deficiencies in achieving the objectives of SDMP

Defined objectives	Deficiency in achievement
Strengthen disaster risk governance at all levels from local to centre	State Government did not publish its Disaster Risk Reduction Road Map with committed timelines to ensure a disaster resilient Karnataka (Paragraph 2.1.4.1). Local authorities neither prepared their disaster management plans nor were consulted for preparation of district/State plans (Paragraph 2.1.6.2 and 2.1.4.2). Despite substantial investment on equipment and projects, the deficiencies in forecast mechanism rendered the disaster risk governance unfruitful (Paragraph 5.3.3)
Invest in disaster risk reduction for resilience through structural, non-structural and financial measures, as well as comprehensive capacity development	The State Government and the district administration had not initiated necessary permanent structural measures to mitigate the impact of the flood menace (Paragraph 5.4.2). In test checked districts (Dakshina Kannada and Kodagu districts) which were affected by recurrent landslides, neither structural nor non-structural measures were taken prior to devastation (Paragraph 6.4.1) The State/Kodagu district administration did not comprehensively act on recommendations in the GSI report, due to which the district encountered more severe landslides in the subsequent years (Paragraph 6.5) Funds released for capacity building activities to the districts and CDM-ATI were 12 and 11 per cent respectively of the total releases towards capacity building. (Paragraph 3.1.4.2)
Strengthen disaster risk modelling, assessment, mapping, monitoring and multi-hazard early warning systems	The nodal department for preparation of information on the SDMP and management of disasters in the State was not in possession of any information regarding activities/measures taken up by the respective department/(s) (Paragraph 4.4.2.1) In the absence of basic data, the State Government/KSNDMC could not create the envisaged hydrological models for flood forecasting in the State/region, whereby the investment of ₹2.45 crore on the sensors and stream gauge monitors was rendered largely unfruitful (Paragraph 5.3.3.1). Purpose of installing required equipment at grassroots level for alerting endangered population from flood early warning through a wireless broadcasting system at a cost of ₹1.09 crore was not achieved (Paragraph 5.3.3.2) As of December 2023, despite an expenditure of ₹1.61 crore with respect to the project pertaining to 'Preparation of urban flood model for Bengaluru' the flood forecast alert model is yet to be prepared. (Paragraph 5.3.3.3) As of December 2023, 49 out of 100 WLS installed on storm water drains were non-functional (Paragraph 5.3.3.4). The State had prepared flood hazard zoning maps for each of the river basins and identified villages prone to floods, however, such vulnerability mapping was not done for the plain areas, which were not covered under river flow

Defined objectives	Deficiency in achievement
	paths but were affected by water inundation due to heavy rainfall. (Paragraph 5.3.4) The State was yet to frame and enact the Floodplain Zoning Regulations (Paragraph 5.3.5) In the absence of advanced technological equipment and early warning systems, the Government/district authorities could not disseminate any alerts (Paragraph 6.3.4.2)
Promote "Build Back Better" in recovery, rehabilitation and reconstruction	There were instances of (i) delays in taking up reconstruction/restoration works due to which the public were forced to take alternate longer routes. (ii) incomplete occupation of constructed houses by affected families. (iii) occupation of damaged houses. (Paragraph 5.7,6.6.1 and 6.6.2)
Prevent disasters and achieve substantial reduction of disaster risk and losses in lives, livelihoods, health, and assets (economic, physical, social, cultural and environmental)	State Government did not initiate preventive/mitigative measures like water harvesting, ground water recharge, controlling ground water extraction, etc., against drought resulting in State experiencing drought repeatedly causing huge loss of agricultural crops and socio-economic disorders (Paragraphs 4.4.2). Absence of flood zonation maps and preventive actions against flood hazard resulted in same villages/localities being affected by floods causing loss of public infrastructure and livelihood. (Paragraph 5.3.5) Unauthorized constructions were regularized, and agricultural land continued to be converted for commercial uses, highlighting inadequacies in disaster-resilient infrastructure planning and execution (Paragraphs 6.5.1). While the project for cyclone risk mitigation was not commissioned the recommendations against lightning were not implemented exposing the communities to danger of hazards. (Paragraph 7.1.1 and 7.2.3)
Empower both local authorities and communities as partners to reduce and manage disaster risks	None of the local authorities in the test-checked districts had prepared the required DM plans (Paragraph 2.1.6.2) Neither the State Government nor the district administrations involved communities, NGOs and CSOs in drought-proofing/mitigation activities (Paragraph 4.4.2.4)
Capacity development at all levels to effectively respond to multiple hazards and for community-based disaster management	Expenditure of the Government towards capacity building and preparedness during the Audit period was grossly inadequate (Paragraph 2.2). No funds were provided to DDMAs towards capacity building and training till the year 2020-21 (Paragraph 2.2.6). None of the authorities like KSDMA, SEC or Revenue Department (Disaster Management) had taken up effective IEC activities at the macro level towards disaster management (Paragraph 2.2.7).

Defined objectives	Deficiency in achievement
Promote the culture of disaster risk prevention and mitigation at all levels	While the communities at the gross root level were not provided training to promote the culture of disaster risk mitigation, the training provided to government employees and the elected representatives was inadequate (Paragraphs 2.2.3 and 2.2.6) None of the publications for disaster risk prevention and management were published in regional language, to enable ease of understanding the stipulated disaster risk mitigation strategies. State Government did not provide publicity among communities/public regarding the NIDM courses on disaster risk management awareness, available free of cost (Paragraphs 2.1.7 and 2.2.7).
Build and strengthen the resilience of poor communities to prevent disasters aggravating poverty and to protect livelihoods	The district/taluk authorities had significant unspent balances at the end of March 2023 (Paragraph 3.1.4.1) During 2017-23, KSNDMC spent ₹21.77 crore and as at the end of March 2023 held a balance of ₹27.04 crore in its bank account which constituted more than 50 *per cent* of the releases. There was payment of compensation under SDRF to ineligible cases. No additional employment was provided under MGNREGS to any of the households in the districts of Dakshina Kannada, Kodagu and Shivamogga (Paragraph 3.1.4.2, 3.1.7 and 4.4.3.1) None of the authorities regulated inhabitations in low lying areas along rivers, canals and drains, as evidenced in audit in the test-checked districts of Belagavi, Dakshina Kannada, Davanagere, Shivamogga, etc (Paragraph 5.4.1) Payment of compensation without initiating preventive measures and proper verification allowed people to continue residing at places exposed to danger (Paragraph 5.5.4)
Promote disaster-resilient schools, colleges and other educational facilities	None of the educational institutions prepared their disaster management plans (Paragraph 2.1.6.3)
Strengthening and promoting the resilience of new and existing critical infrastructure	The State did not establish a legal framework for obtaining mandatory clearances by agencies for construction of public infrastructure in flood-prone areas There was no safety audit of houses in districts vulnerable to flood which otherwise would have led to taking up disaster resilient retrofitting and rectification actions timely. Disaster resilience was not adequately promoted while constructing/repairing infrastructure, affecting resistance to floods (Paragraph 5.4.1, 5.4.3 and 5.5).

Appendix 3.1
(Reference: Paragraph-3.1.3, Page No. 31)
Discrepancies in accounts between Revenue Department and Accountant General (A and E)

Receipts

(₹ in crore)

Year	Opening Balance			NDRF grants			SDRF grants			State matching grants		
	As per department	As per AG	Difference	As per department	As per AG	Difference	As per department	As per AG	Difference	As per department	As per AG	Difference
2017-18	1235.52	1235.52	0	913.04	913.04	0	228.75	228.75	0	76.25	76.25	0
2018-19	0	42.16	42.16	959.84	959.84	0	288.00	288.00	0	32.00	32.00	0
2019-20	434.62	434.62	0	2744.26	2905.28	161.02	204.00	507.00	303.00	132.00	369.00	237.00
2020-21	0	0	0	577.84	689.27	111.43	632.40	632.80	0.40	210.80	210.40	0.40
2021-22	0	2.42	2.42	1734.3	1623.3	-111.00	632.40	632.80	0.40	210.80	210.40	0.40
2022-23	0	2.42	2.42	939.83	939.83	0	664.01	664.00	0.01	221.33	221.34	0.01

Expenditure

(₹ in crore)

Year	Expenditure as per department	Expenditure booked in AG (A&E)	Difference
2017-18	2,411.61	2,411.58	0.03
2018-19	1,207.22	1,196.96	10.26
2019-20	4,899.52	4,879.43	20.09
2020-21	2,238.37	2,235.56	2.81
2021-22	5,003.75	4,965.14	38.61
2022-23	2,939.41	2,897.58	41.83

Source: Information furnished by department and AG (A&E) office.

Appendix 3.2
(Reference: Paragraph-3.1.4.1, Page No. 33)
Instances of non/improper maintenance of cash books

District	Deficiencies observed
Belagavi	Tahsildar, Athani – Cash book was not written from 19.7.2019 to 31.3.2023 Tahsildar, Mudalgi – 2018-19 to 2022-23 Tahsildar, Nippani – 25.03.2021 to 31.03.2023 Tahsildars, Belagavi, Chikkodi, Hukkeri, Kagawad and Ramdurg – Partially written.
Chikkaballapura	Cash book was not maintained by Tahsildar, Chintamani till November 2021; Tahsildar, Bagepalli till December 2021; Tahsildar, Gowribidanur for the year 2017-18, Tahsildar, Gudibande till May 2019, Tahsildar, Shidlaghatta till December 2020 and Tahsildar, Chickaballapur for the year 2017-18.
Dakshina Kannada	Cash book was not maintained by Tahsildar, Sullia up to 2021-22; Tahsildar, Moodabidri up to 2018-19; Tahsildar, Kadaba up to 2020-21 and Tahsildar, Belthangady up to 2021-22. Tahsildar, Bantwal did not produce any records relating to DM funds though ₹7.03 crore was released during the period 2017-2023. The taluk authorities had written the cash book based on bank pass sheet entries and not as and when the transactions occurred. The cash book entries did not contain proper narration of payments made except for name of the beneficiary and amount in all the taluks.
Davanagere	Tahsildar, Davanagere had shown only one entry for each month without distinctly showing each transaction. Cash book was not maintained by Tahsildar, Jagalur till May 2019.
Haveri	Cash book was not maintained by Tahsildar, Shiggaon till 30.06.2018 and Tahsildar, Rattihalli had not written for the year 2020-21.
Kodagu	Tahsildar, Somwarpet had not written the cash book for the year 2017-18.
Shivamogga	Tahsildar, Shivamogga had not written cashbook for the entire year 2022-23

Appendix 3.3
(Reference: Paragraph-3.1.4.1, Page No. 33)
Statement showing the taluk wise number of bank accounts operated by Tahsildars in test-checked districts

District	Taluk	Number of bank accounts
Belagavi	Belagavi	03
	Gokak	03
	Khanapur	02
	Nippani	04
	Ramdurg	04
Chikkaballapura	Chikkaballapura	05
	Gauribidanur	05
Davanagere	Davanagere	02
	Nyamathi	02
Haveri	Byadagi	06
	Hanagal	02
	Haveri	04
	Hirekerur	04
	Ranebennur	04
	Rattihalli	03
	Savanar	02
	Shiggaon	06
Kodagu	Somwarpet	02
	Virajpet	02
Shivamogga	Shivamogga	03
	Bhadravathi	03
	Sagara	02
	Soraba	02

Source: Information furnished by taluk authorities.

Appendix 3.4
(Reference: Paragraph-3.1.4.1, Page No. 34)
Statement showing the discrepancy in release of funds between books of accounts of the district and taluks for the period 2017-18 to 2021-22

District: Belagavi

(₹ in crore)

Taluk	Releases as per district accounts	Receipt as per taluk accounts	Difference
Belagavi	23.49	12.91	10.58
Hukkeri	22.81	21.74	1.07
Kittur	7.13	6.74	0.39
Ramdurg	30.03	28.85	1.18
Gokak	60.08	59.53	0.55
Chikkodi	103.03	102.89	0.14
Raibag	61.23	42.44	18.79
Athani	93.45	75.31	18.14

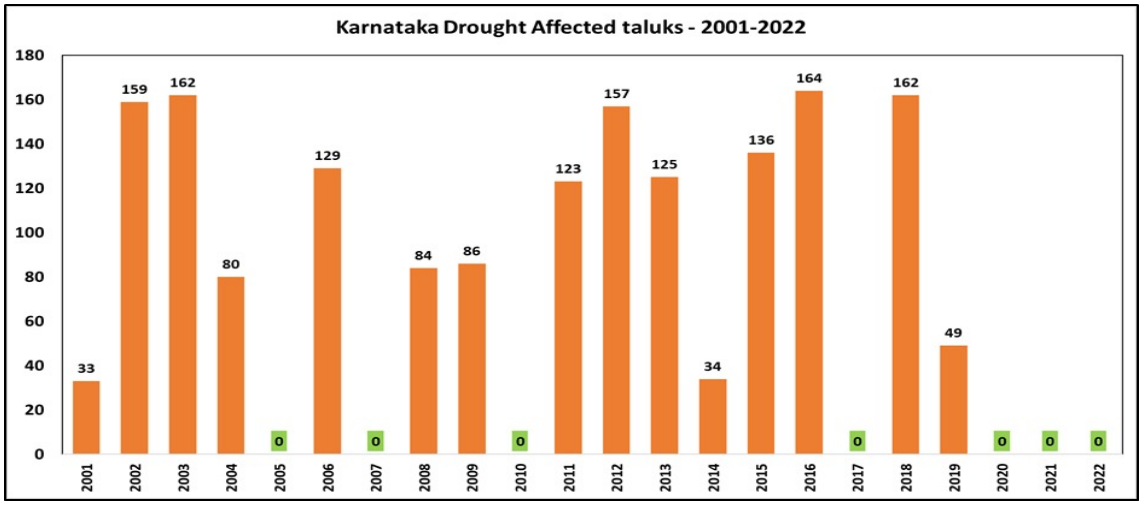
Appendix 3.5
(Reference: Paragraph-3.1.8, Page No. 39)
Illustrative instances of execution of works in violation of the guidelines and monetary limits under SDRF grants

(₹ in lakh)

Name of the taluk	Name of the work	Estimated cost	Expenditure
Kalaburagi District			
Chittapur	Firozabad-Kamalapur State highway No.125 chainage 44.20 km repair to bridge	55.00	53.81
Aland	Repairs to bridge at Km 43.00 on Basavakalyan-Raichur (SH-51) road	10.00	9.76
Kalaburagi	Repairs to Electrical Installations and Allied Equipments at Saradagu Head works and IPS Kotnoor for water supply system in Kalaburagi city	28.13	28.13
Sedam	Repairs to Mudhol-Yanagundi Road of chainage 0.00 km to 0.50 km	20.00	18.89
	Repairs to check dam in Udagi-Kurukunta-Hayyala road at chainage 23.80 km	18.00	17.99
Dakshina Kannada District			
Bantwal	Repairs to school building at Talemogaru	10.00	NA
	Repairs to school building at pudu maple	10.00	NA
	Repairs and widening of road at Pudu GP	20.00	NA
	Road repair at Pajeer village	20.00	NA
	Road repair at Balepuni village	10.00	NA
	Road repair at Geru paddu	10.00	NA
Mangaluru	Construction of drainage at Ward No.2	10.00	NA
	Asphalting of road in Derebylu	12.00	NA
	CC road at ward No.52	10.00	NA
	Repairs to road at Belma gram panchayat	15.00	NA
	Repairs to junction at Belma gram panchayat	15.00	NA
	Repairs to Government school building at Belma GP	15.00	NA
	Construction of retaining wall to house	10.00	NA
	Road repair at Manjanadi GP	15.00	NA
	Road repair at Manjanadi GP	20.00	NA
	Road repair at Pavuru GP	15.00	NA
	Road repair at Pavuru GP	15.00	NA
	Road repair at Hirekala GP	15.00	NA
	Road repair at Hirekala GP	15.00	NA
	Road repair at Hirekala GP	10.00	NA
	Road repair at Munnur GP	10.00	NA
	Road repair at someswara GP	10.00	NA
	Road repair at Konaji GP	10.00	NA
	Road repair at Konaji GP	10.00	NA
	Road repair at Konaji GP	10.00	NA
	Road repair at Konaji GP	10.00	NA
	Road repair at Ullal	15.00	NA
	Road work at Ullal	10.00	NA
	School building repair at Ullal	20.00	NA

Name of the taluk	Name of the work	Estimated cost	Expenditure
	Electricity repair to Tippu Sultan school building at Ullal	15.00	NA
	Construction of drainage at Sundarbagh, Ullal	10.00	NA
	Road repair at Kotekar Town Panchayat	20.00	NA
	Construction of bridge at Kotekar	10.00	NA
Belagavi District			
Savadatti	Repairs to school buildings Manavalli village	12.00	10.80
	Repairs to school buildings Manavalli village	9.00	8.10
	Repairs to school buildings Mulluru village	10.50	10.50
	Repairs to school buildings Holi village	7.50	6.75
	Repairs to school buildings Theredakoppa Thanda village	6.00	5.40

Appendix 4.1
(Reference: Paragraph-4.2, Page No. 43)
Data on taluks affected by drought during 2001-2022



Source: KSNDMC.

Appendix 5.1
(Reference: Paragraph-5.1.2, Page No. 59)
Estimated loss of infrastructure and crops in the State districts due to flood between the years 2018-2022

(₹ in crore)

Nature of damage	2018	2019	2020	2021	2022
Agriculture crop	313.52	13829.24	14090.27	8137.00	4975.82
Horticulture crop	1043.82	926.10	2155.80	1471.00	1428.11
Plantation crop	863.36	475.36	650.02	1401.90	265.51
Roads	1452.81	7034.03	4369.12	4325.73	3283.15
Bridges	90.04	1020.09	700.18	865.14	452.32
Houses	167.51	9621.87	430.75	690.08	699.51
Water supply and Sanitation units	6.34	122.94	37.60	39.09	11.60
Tanks	25.10	63.61	58.39	53.83	67.11
Total	**5980.50**	**35112.24**	**24512.13**	**19004.77**	**13205.13**

Source: Data furnished by the nodal department.

Appendix 5.2
(Reference: Paragraph-5.5.2, Page No. 73)
Discrepancies in house damages

a) 25 *per cent* of damage categorized as C and B

District	Taluk	Beneficiary ID	Percentage of damage as per department	Category in RGRHCL website
Ramanagara	Kanakapura	368424	25	B1
	Kanakapura	367593	25	C
	Magadi	367942	25	C
Shivamogga	Shikaripura	589696	25	B1
	Shivamogga	579770	25	C
	Soraba	577862	25	C
		577694	25	B1
Chikkaballapura	Sidlaghatta	375741	25	C
Davanagere	Channagiri	693547	25	C
		676265	25	C

(b) (i) Cases where 25 *per cent* to 40 *per cent* of damage categorised as A or B2

District	Taluk	Beneficiary ID	Percentage of damage as per department	Category in RGRHCL website
Belagavi	Ramdurg	1681085	26	B2
		1678875	30	B2
		1679626	35	B2
		1692912	26	B2
		1678162	40	B2
	Hukkeri	1681085	26	B2
		1681220	28	B2
		1679282	28	B2
		1679447	28	B2
	Bailhongal	1685715	30	B2
		1680510	35	B2
		1697380	30	B2
Shivamogga	Shivamogga	587698	35	B2
		587741	40	B2
		587740	40	B2
	Shikaripura	588332	35	B2
	Bhadravathi	587929	28	A
	Soraba	580420	27	B2
	Sagara	588011	28	B2
		588216	24	B2
		588014	22	B2
Chikkaballapura	Gauribidanur	374398	20	B2
		374400	23	B2
		374397	25	B2
		374401	24	B2
		374403	25	B2
		374402	23	B2

District	Taluk	Beneficiary ID	Percentage of damage as per department	Category in RGRHCL website
Ramanagara	Magadi	367882	40	B2
Davanagere	Nyamathi	680248	30	B2

(ii) Cases where 70 *per cent* to 75 *per cent* of damage categorised as B1

District	Taluk	Beneficiary ID	Percentage of damage as per department	Category in RGRHCL website
Chikkaballapura	Chintamani	367512	71	B1
		367514	74	B1
		367713	74	B1
		367551	74	B1
		367434	74	B1
		367318	72	B1
	Bagepalli	366436	74	B1
	Gauribidanur	366764	74	B1
		366648	74	B1
		366879	74	B1
		367151	74	B1
		374576	74	B1
		374176	74	B1

(c) Upward revision of category of damages in Haver district

District	Taluk	Beneficiary ID	Revision of category	Excess paid due to revision *(in ₹)*
Haveri	Savanur	643035	C to B1	250000
		643649	C to B1	250000
		643308	C to B1	250000
		645911	C to B1	250000
		640195	C to B1	250000
		642048	C to B1	250000
		644865	C to B1	250000
		648225	C to B1	250000
		646325	C to B1	250000
	Hanagal	678782	C to B2	450000
		683632	C to B2	450000
		684212	C to B2	450000
		687982	C to B2	450000
		689836	C to B2	450000
	Haveri	664081	C to B2	450000
		669411	C to B2	450000
		678874	C to B2	450000
		681054	C to B2	450000
	Hirekerur	664252	C to B2	450000
		666268	C to B2	450000
		667497	C to B2	450000
	Rattihalli	665583	C to B2	450000

		667484	C to B2	450000
		667553	C to B2	450000
	Shiggaon	679291	C to B2	450000
		679299	C to B2	450000
		679796	C to B2	450000
		683815	C to B2	450000

(d) Discrepancies in category of damage between department and RGRHCL website

(i) A/B1/B2 to C:

District	Taluk	Beneficiary ID	Category of damage as per department	Category of damage as per RGRHCL website
Ramanagar	Kanakapura	368667	B1	C
		362112	B1	C
	Magadi	368659	B2	C
		368946	B	C
		368504	B	C
		367966	B1	C
		368499	B	C
		367965	B	C
		369018	B	C
		368412	B	C
		368502	B	C
		368498	B	C
		368036	B	C
		369018	B	C
Chikkaballapura	Shidlaghatta	368052	B1	C
	Gudibande	376071	B2	C
		375760	B2	C
		375756	B1	C
		375911	A	C
		374451	B1	C
		366056	B1	C

(ii) C to B1/B2:

District	Taluk	Beneficiary ID	Category of damage as per department	Category of damage as per RGRHCL website	Excess paid due to revision *(in ₹)*
Chikkaballapura	Gauribidanur	365944	C	B2	450000
		375661	C	B1	250000
		374398	C	B2	450000
		374400	C	B2	450000
		374397	C	B2	450000
		374401	C	B2	450000
		374403	C	B2	450000
		374402	C	B2	450000

District	Taluk	Beneficiary ID	Category of damage as per department	Category of damage as per RGRHCL website	Excess paid due to revision *(in ₹)*
	Gudibande	366051	C	B2	450000
		367960	C	B2	450000
Shivamogga	Thirthahalli	586077	C	B2	450000
		584793	C	B2	450000
		584673	C	B2	450000
	Sagara	588014	C	B2	450000
		588216	C	B2	450000

(iii) B1 to B2:

District	Taluk	Beneficiary ID	Category of damage as per department	Category of damage as per RGRHCL website	Excess paid due to revision *(in ₹)*
Shivamogga	Bhadravathi	587929	B1	A	200000
Chikkaballapura	Bagepalli	367078	B1	B2	200000
		367081	B1	B2	200000
		367085	B1	B2	200000
		367093	B1	B2	200000
		367096	B1	B2	200000
		367106	B1	B2	200000
	Gudibande	366147	B1	B2	200000
		366227	B1	B2	200000
		366223	B1	B2	200000
		366216	B1	B2	200000
	Gauribidanur	365950	B1	B2	200000
		365960	B1	B2	200000
	Sidlaghatta	376105	B1	B2	200000

iv) A/B2 to B1 cases

District	Taluk	Beneficiary ID	Category of damage as per department	Category of damage as per RGRHCL website
Chikkaballapura	Sidlaghatta	375749	B2	B1
		368046	B2	B1
	Gauribidanur	366724	B2	B1
		367710	B2	B1
		366764	B2	B1
		366653	B2	B1
		366655	B2	B1
		366645	B2	B1
		366648	B2	B1
		366750	B2	B1
		366770	B2	B1
		366879	B2	B1
		367151	B2	B1

		366698	B2	B1
		375812	B2	B1
		374576	B2	B1
		374176	B2	B1
	Gudibande	366101	B2	B1
		366086	B2	B1
		366084	B2	B1
		374500	B2	B1
		374178	A	B1
	Bagepalli	366018	B2	B1
		366436	B2	B1
		367932	B2	B1
		367933	B2	B1
		368041	B2	B1
		366155	B2	B1
		367146	B2	B1
		367693	B2	B1
		367090	B2	B1
		366131	B2	B1

v) B1 to B2 cases:

District	Taluk	Beneficiary ID	Category of damage as per department	Category of damage as per RGRHCL website	Financial implication *(in ₹)*
Chikkaballapura	Chintamani	367403	B1	B2	200000
		367661	B1	B2	200000
		367662	B1	B2	200000
		367318	B1	B2	200000
	Gauribidanur	365950	B1	B2	200000
		365960	B1	B2	200000
	Gudibande	366147	B1	B2	200000
		366227	B1	B2	200000
		366223	B1	B2	200000
		366216	B1	B2	200000
	Bagepalli	367093	B1	B2	200000
		367096	B1	B2	200000
		367106	B1	B2	200000
		367081	B1	B2	200000
		367078	B1	B2	200000

e) Cases where the Engineer's report is not on record:

District	Taluk	Beneficiary ID	Percentage damage as per department
Shivamogga	Hosanagara	585944	B (50)
		585801	C
		585775	C
		585828	B (50)
		585836	C
		585839	B (75)
		585789	B (50)

District	Taluk	Beneficiary ID	Percentage damage as per department
		585786	A
		585785	C
		585849	B (50)
		585804	A
		584468	A
	Sagara	588013	B (50)
		580009	B (50)
		588011	B (50)
		588216	B (50)
		588014	B (50)
		587887	B (50)
	Shivamogga	587698	B (35)
		587741	B (40)
		587740	B (40)
Chikkaballapura	Chintamani	367392	B1
		367658	B1
		367194	B1
		367409	B1
		367255	B1
		367227	B1
		367617	B1
	Sidlaghatta	375741	25
		375653	--
		375657	--
		374227	--
		374235	--
	Gauribidanur	366698	--
		374405	A
		375812	B2
		375661	B1
	Gudibande	366091	--
	Bagepalli	368055	--
		366111	--
		366131	B2

Appendix 5.3
(Reference: Paragraph 5.5.3, Page No. 76)
Illustrative cases of irregular payment of compensation towards crop loss under *Parihara* portal

(i) Farmers given compensation more than the eligible amount

Aadhaar Number	Type of crop	Year/season	Calamity	Amount paid *(in ₹)*
XXXXXXXX4809	Horticulture	2019-20/ Kharif	Flood	58120
XXXXXXXX7329	Perennial	2018-19/Kharif	Flood	61918
XXXXXXXX1684	Perennial	2018-19/Kharif	Flood	61918
XXXXXXXX7646	Perennial	2018-19/Kharif	Flood	61918
XXXXXXXX2041	Perennial	2018-19/Kharif	Flood	61557
XXXXXXXX1660	Perennial	2018-19/Kharif	Flood	61557
XXXXXXXX7309	Perennial	2018-19/Kharif	Flood	61918
XXXXXXXX2149	Perennial	2018-19/Kharif	Flood	61198
XXXXXXXX6723	Perennial	2018-19/Kharif	Flood	61198
XXXXXXXX5987	Perennial	2018-19/Kharif	Flood	64798
XXXXXXXX0523	Perennial	2018-19/Kharif	Flood	62638

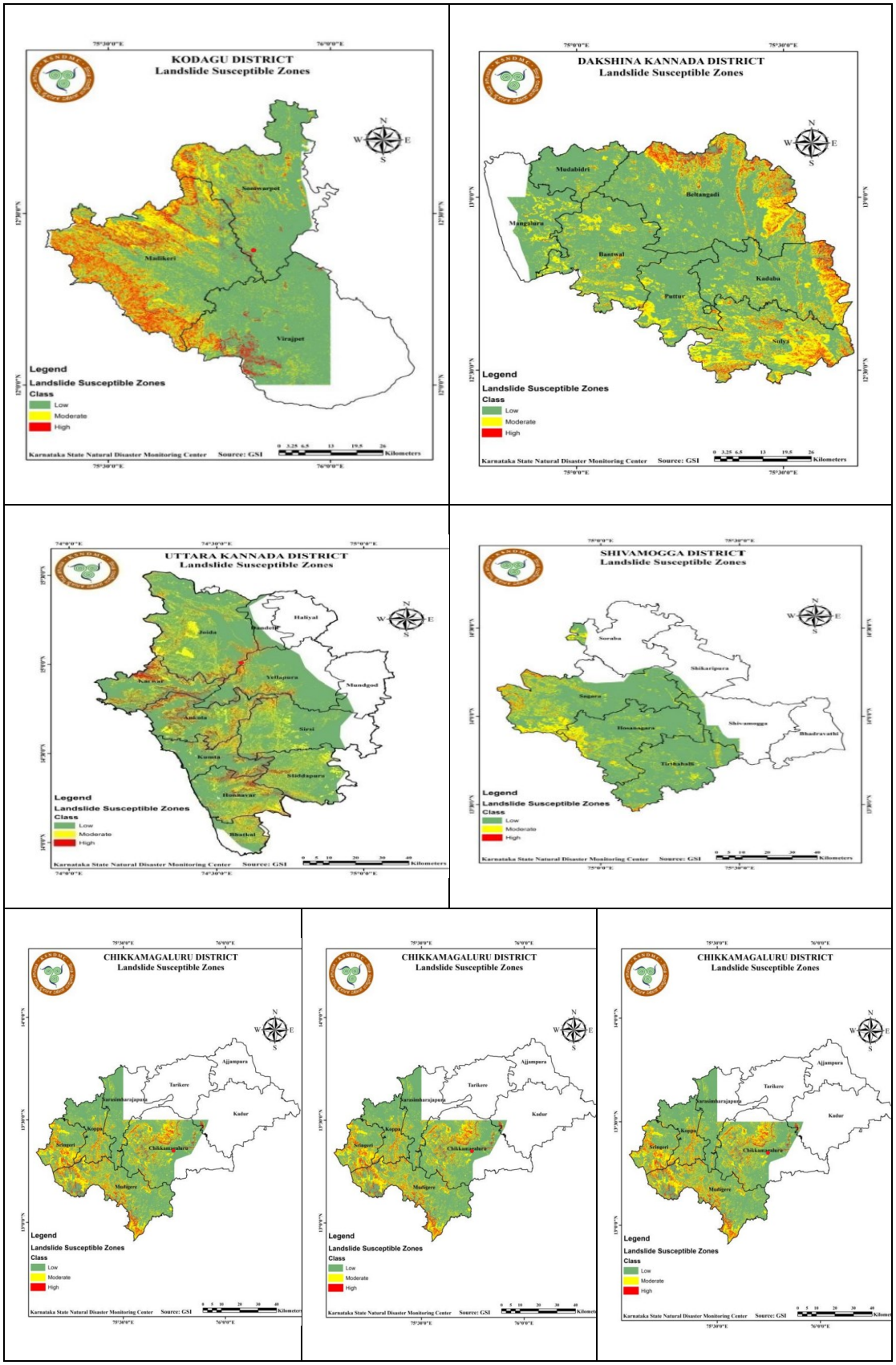
(ii) Farmers having more than two hectares of land paid compensation under category C and D

Aadhaar Number	Type of crop	Year/season	Calamity	Amount paid *(in ₹)*	Extent of land holding
XXXXXXXX2956	Perennial	2018-19/ Kharif	Landslide	74999	More than 14 acre
			Desilting	16567	
XXXXXXXX8898	Perennial	2018-19/ Kharif	Landslide	74999	More than 6 acre
XXXXXXXX7329	Perennial	2019-20/ Kharif	Landslide	74999	More than 28 acre
XXXXXXXX5727	Perennial	2018-19/ Kharif	Landslide	74999	More than 12 acres
XXXXXXXX3822	Perennial	2018-19/ Kharif	Landslide	74999	More than 15 acres
XXXXXXXX4302	Perennial	2018-19/ Kharif	Landslide	59999	More than 8 acres
XXXXXXXX1672	Perennial	2018-19/ Kharif	Landslide	74999	10 acres
XXXXXXXX7077	Perennial	2018-19/ Kharif	Landslide	74999	More than 6 acre
XXXXXXXX6260	Perennial	2019-20/ Kharif	Landslide	74999	More than 5 acres

(iii) Farmers paid compensation under categories both A/B and D categories

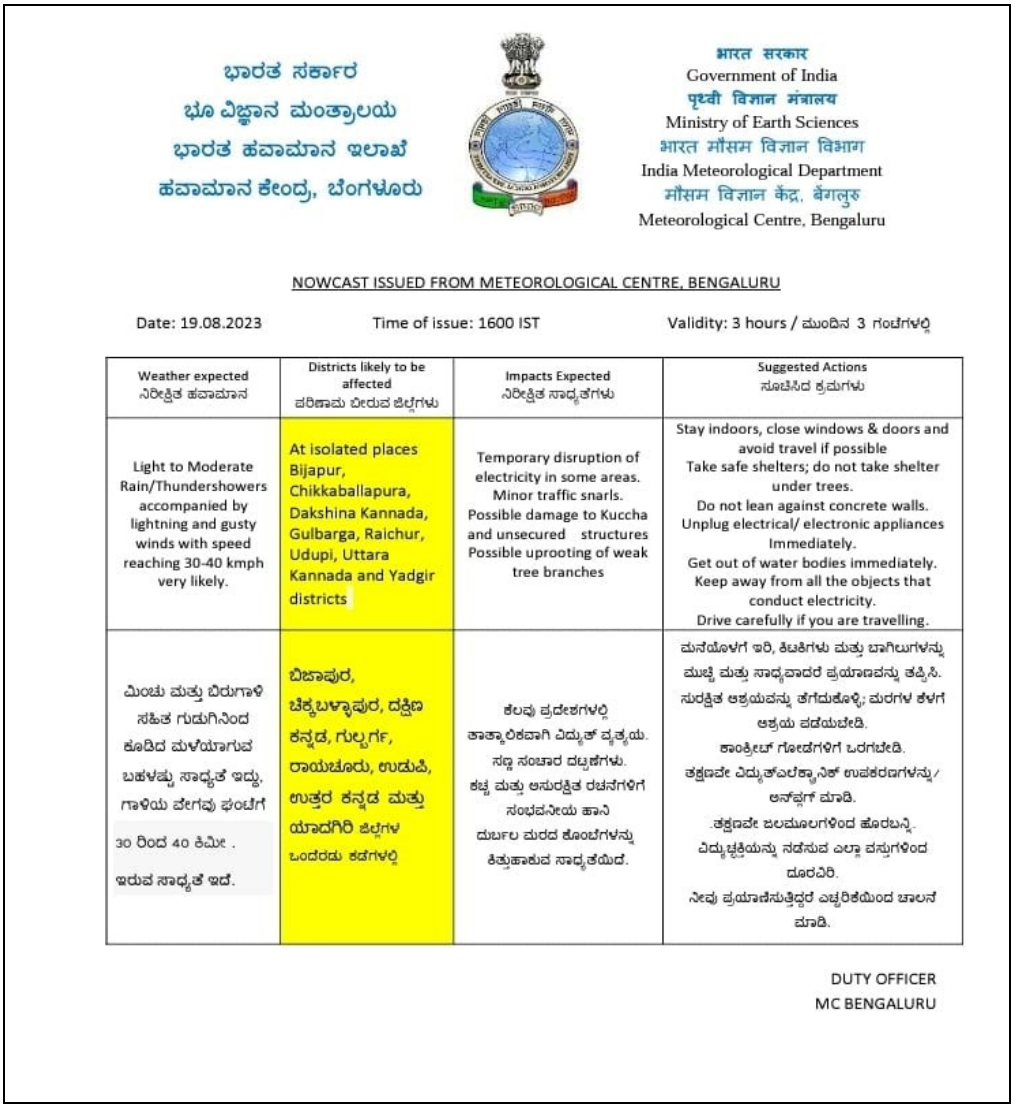
Aadhar Number	Type of crop	Year/season	Calamity	Amount paid *(in ₹)*
XXXXXXXX2956	Perennial	2018-19/Kharif	Landslide	74999
			Desilting	16567
			Flood	35998
XXXXXXXX7329	Perennial	2019-20/Kharif	Landslide	74999
			Flood	55999
XXXXXXXX6770	Perennial	2018-19/Kharif	Landslide	74999
			Flood	35999
XXXXXXXX5727	Perennial	2018-19/Kharif	Landslide	74999
			Flood	35999
XXXXXXXX7415	Perennial	2018-19/Kharif	Landslide	74999
			Flood	35999
XXXXXXXX3822	Perennial	2018-19/Kharif	Landslide	74999
			Flood	50398
XXXXXXXX3904	Perennial	2019-20/Kharif	Landslide	67499
			Flood	35799
XXXXXXXX4302	Perennial	2018-19/Kharif	Landslide	59999
			Flood	43199
XXXXXXXX2163	Perennial	2019-20/Kharif	Landslide	44999
			Flood	45359
XXXXXXXX7836	Perennial	2019-20/Kharif	Landslide	74999
			Flood	47375
XXXXXXXX1672	Perennial	2018-19/Kharif	Landslide	74999
			Flood	35999
XXXXXXXX6260	Perennial	2019-20/Kharif	Landslide	74999
			Flood	34718

Appendix 6.1
(Reference: Paragraph-6.3.2, Page No. 84)
District-wise landslide susceptibility maps



Source: Karnataka State Action Plan: Management of Landslides – 2022.

Appendix 7.1
(Reference: Paragraph-7.2.1.2, Page No.105)
Nowcast lightning warnings issued by IMD



ಭಾರತ ಸರ್ಕಾರ
ಭೂ ವಿಜ್ಞಾನ ಮಂತ್ರಾಲಯ
ಭಾರತ ಹವಾಮಾನ ಇಲಾಖೆ
ಹವಾಮಾನ ಕೇಂದ್ರ, ಬೆಂಗಳೂರು

भारत सरकार
Government of India
पृथ्वी विज्ञान मंत्रालय
Ministry of Earth Sciences
भारत मौसम विज्ञान विभाग
India Meteorological Department
मौसम विज्ञान केंद्र, बेंगलुरु
Meteorological Centre, Bengaluru

NOWCAST ISSUED FROM METEOROLOGICAL CENTRE, BENGALURU

Date: 19.08.2023 Time of issue: 1600 IST Validity: 3 hours / ಮುಂದಿನ 3 ಗಂಟೆಗಳಲ್ಲಿ

Weather expected ನಿರೀಕ್ಷಿತ ಹವಾಮಾನ	Districts likely to be affected ಪರಿಣಾಮ ಬೀರುವ ಜಿಲ್ಲೆಗಳು	Impacts Expected ನಿರೀಕ್ಷಿತ ಸಾಧ್ಯತೆಗಳು	Suggested Actions ಸೂಚಿಸಿದ ಕ್ರಮಗಳು
Light to Moderate Rain/Thundershowers accompanied by lightning and gusty winds with speed reaching 30-40 kmph very likely.	At isolated places Bijapur, Chikkaballapura, Dakshina Kannada, Gulbarga, Raichur, Udupi, Uttara Kannada and Yadgir districts	Temporary disruption of electricity in some areas. Minor traffic snarls. Possible damage to Kuccha and unsecured structures Possible uprooting of weak tree branches	Stay indoors, close windows & doors and avoid travel if possible Take safe shelters; do not take shelter under trees. Do not lean against concrete walls. Unplug electrical/ electronic appliances Immediately. Get out of water bodies immediately. Keep away from all the objects that conduct electricity. Drive carefully if you are travelling.
ಮಿಂಚು ಮತ್ತು ಬಿರುಗಾಳಿ ಸಹಿತ ಗುಡುಗಿನಿಂದ ಕೂಡಿದ ಮಳೆಯಾಗುವ ಬಹಳಷ್ಟು ಸಾಧ್ಯತೆ ಇದ್ದು, ಗಾಳಿಯ ವೇಗವು ಘಂಟೆಗೆ 30 ರಿಂದ 40 ಕಿಮೀ . ಇರುವ ಸಾಧ್ಯತೆ ಇದೆ.	ಬಿಜಾಪುರ, ಚಿಕ್ಕಬಳ್ಳಾಪುರ, ದಕ್ಷಿಣ ಕನ್ನಡ, ಗುಲ್ಬರ್ಗ, ರಾಯಚೂರು, ಉಡುಪಿ, ಉತ್ತರ ಕನ್ನಡ ಮತ್ತು ಯಾದಗಿರಿ ಜಿಲ್ಲೆಗಳ ಒಂದರಡು ಕಡೆಗಳಲ್ಲಿ	ಕೆಲವು ಪ್ರದೇಶಗಳಲ್ಲಿ ತಾತ್ಕಾಲಿಕವಾಗಿ ವಿದ್ಯುತ್ ವ್ಯತ್ಯಯ. ಸಣ್ಣ ಸಂಚಾರ ದಟ್ಟಣೆಗಳು. ಕಚ್ಚ ಮತ್ತು ಅಸುರಕ್ಷಿತ ರಚನೆಗಳಿಗೆ ಸಂಭವನೀಯ ಹಾನಿ ದುರ್ಬಲ ಮರದ ಕೊಂಬೆಗಳನ್ನು ಕಿತ್ತುಹಾಕುವ ಸಾಧ್ಯತೆಯಿದೆ.	ಮನೆಯೊಳಗೆ ಇರಿ, ಕಿಟಕಿಗಳು ಮತ್ತು ಬಾಗಿಲುಗಳನ್ನು ಮುಚ್ಚಿ ಮತ್ತು ಸಾಧ್ಯವಾದರೆ ಪ್ರಯಾಣವನ್ನು ತಪ್ಪಿಸಿ. ಸುರಕ್ಷಿತ ಆಶ್ರಯವನ್ನು ತೆಗೆದುಕೊಳ್ಳಿ; ಮರಗಳ ಕೆಳಗೆ ಆಶ್ರಯ ಪಡೆಯಬೇಡಿ. ಕಾಂಕ್ರೀಟ್ ಗೋಡೆಗಳಿಗೆ ಒರಗಬೇಡಿ. ತಕ್ಷಣವೇ ವಿದ್ಯುತ್‌ಎಲೆಕ್ಟ್ರಾನಿಕ್ ಉಪಕರಣಗಳನ್ನು/ ಅನ್‌ಪ್ಲಗ್ ಮಾಡಿ. .ತಕ್ಷಣವೇ ಜಲಮೂಲಗಳಿಂದ ಹೊರಬನ್ನಿ. ವಿದ್ಯುಚ್ಛಕ್ತಿಯನ್ನು ನಡೆಸುವ ಎಲ್ಲಾ ವಸ್ತುಗಳಿಂದ ದೂರವಿರಿ. ನೀವು ಪ್ರಯಾಣಿಸುತ್ತಿದ್ದರೆ ಎಚ್ಚರಿಕೆಯಿಂದ ಚಾಲನೆ ಮಾಡಿ.

DUTY OFFICER
MC BENGALURU

Source: Social media (X) handle of KSNDMC.

Abbreviations

AG (A&E)	Accountant General (Accounts & Entitlements)
APL	Adaptable Programme Loan
ATI	Administrative Training Institute
BBMP	Bruhat Bengaluru Mahanagara Palike
CAP	Common Alerting Protocol
CDM	Centre for Disaster Management
CLPMP	Comprehensive Landslide Prevention and Mitigation Plan
CRMI	Cyclone Risk Mitigation Infrastructure
CSC	Cabinet Sub-Committee
CSOs	Civil Society Organisations
CWWG	Crop Weather Watch Group
DC	Deputy Commissioner
DDMA	District Disaster Management Authority
DDMP	District Disaster Management Plan
DEOC	District Emergency Operation Centre
DGP	Director General of Police
DM	Disaster Management
DMIS	Drought Management Information System
DMP	Disaster Management Plans
DMR	Digital Mobile Radio
DRR	Disaster Risk Reduction
EO	Earth Observation
EWDS	Early Warning Dissemination Systems
FMP	Flood Management Plans
FRM	Flood Risk Management
GIS	Geographical Information System
GoI	Government of India
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSI	Geological Survey of India
IDA	International Development Association
IDEA	Interactive Data Extraction and Analysis
IEC	Information, Education, and Communication
IISc	Indian Institute of Science
IMD	Indian Meteorological Department
IRS	Incident Response System
IRT	Incidence Response Teams
KGWA	Karnataka Ground Water Authority
KSDMA	Karnataka State Disaster Management Authority
KSNDMC	Karnataka State Natural Disaster Monitoring Centre
LRMS	Landslide Risk Management Strategy
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MHA	Ministry of Home Affairs

MoU	Memorandum of Understanding
MPCS	Multi-Purpose Cyclone Shelters
NCRMP	National Cyclone Risk Mitigation Project
NDMA	National Disaster Management Authority
NDMIS	National Disaster Management Information System
NDRF	National Disaster Response Force
NEC	National Executive Committee
NGOs	Non-Governmental Organisations
NIDM	National Institute for Disaster Management
NOC	No Objection Certificate
PA	Performance Audit
PRED	Panchayat Raj Engineering Department
PWD	Public Works Department
PWPID	Public Works, Ports and Inland Division
RE	Reinforced Earth
RDPR	Rural Development and Panchayat Raj
RGRHCL	Rajiv Gandhi Rural Housing Corporation Limited
RWS	Rural Drinking Water and Sanitation Department
SCMC	State Crisis Management Committee
SDG	Sustainable Development Goal
SDMA	State Disaster Management Authority
SDMF	State Disaster Mitigation Fund
SDMP	State Disaster Management Plan
SDRF	State Disaster Response Force
SDRMF	State Disaster Risk Management Fund
SEC	State Executive Committee
SEOC	State Emergency Operation Centre
SFDRR	Sendai Framework for Disaster Risk Reduction
SHGs	Self Help Groups
SOP	Standard Operating Procedure
SPV	Special Purpose Vehicle
SWD	Storm Water Drain
TRGs/TWSs	Telemetric Rain Gauges / Telemetric Weather Stations
UAV	Unmanned Aerial Vehicles
UC	Utilisation Certificate
UN	United Nations
UNDRR	United Nations Office for Disaster Risk Reduction
VSAT	Very Small Aperture Terminal